United States
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Agency

Hazardous Waste Division

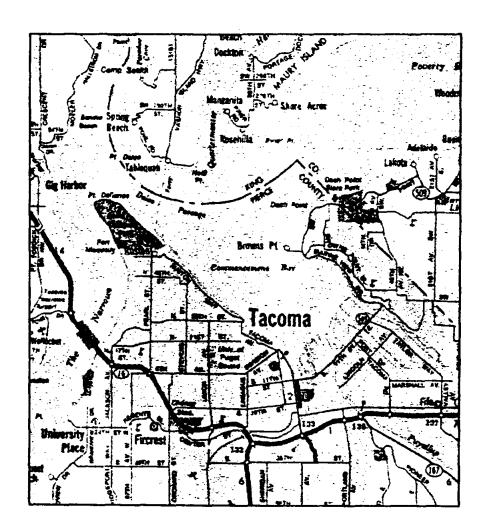
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Source Control Strategy

Commencement Bay Nearshore/Tideflats Superfund Site



Source Control Strategy

Commencement Bay Nearshore/Tideflats Superfund Site

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ACRONYMS AND ABBREVIATIONS

AET apparent effects threshold

AKART all known available and reasonable methods of treat-

ment

ARAR applicable or relevant and appropriate requirement

BMP best management practice

CB/NT Commencement Bay Nearshore/Tideflats

Ecology Washington Department of Ecology
EPA U.S. Environmental Protection Agency

FS feasibility study

NPDES National Pollutant Discharge Elimination System

PLP potentially liable person (state)

PRP potentially responsible party (federal)
PSDDA Puget Sound Dredged Disposal Analysis

RA remedial action

RCRA Resource Conservation and Recovery Act

RD remedial design

RI remedial investigation ROD record of decision

TDG Technical Discussion Group

TPCHD Tacoma-Pierce County Health Department

UBAT Urban Bay Action Team

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1. INTRODUCTION

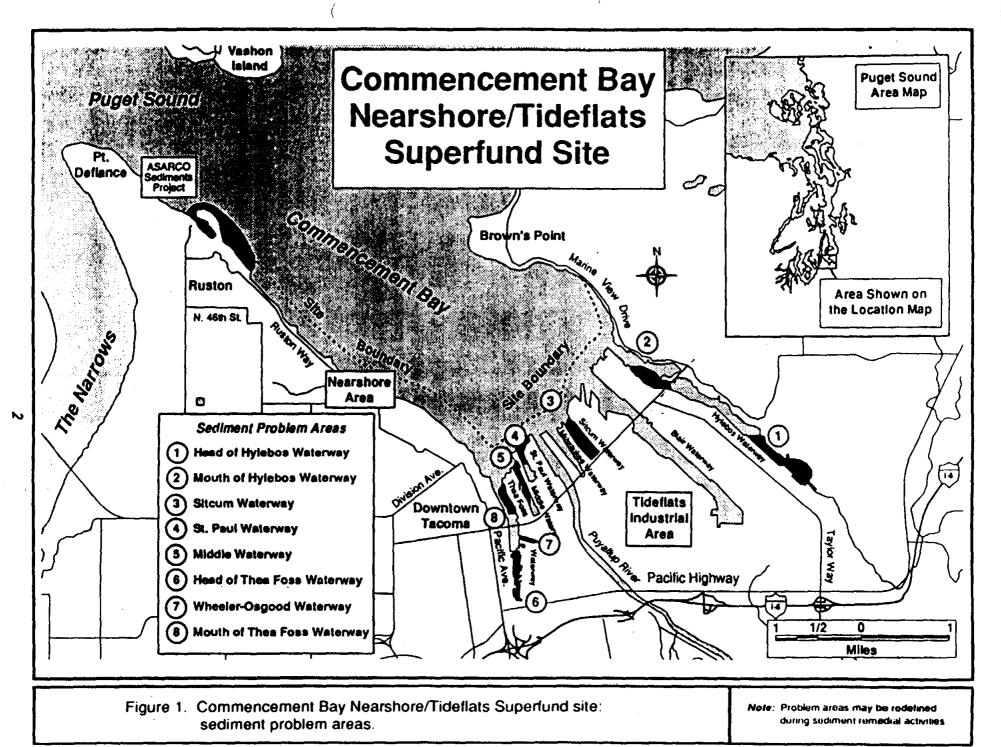
The U.S. Environmental Protection Agency (EPA) and the Washington Department of Ecology (Ecology) are currently implementing the cleanup plan for the Commencement Bay Nearshore/Tideflats (CB/NT) Superfund site in Tacoma, Washington. The cleanup plan involves a two-phase approach that is being implemented in eight problem areas identified at the site (Figure 1). For each problem area, the cleanup plan requires that releases of contaminants to the marine environment be eliminated or reduced to an acceptable level. Once the sources of contaminants have been regulated, marine sediment cleanup activities will be initiated.

This report describes the methods that are currently being used to identify and control contaminant sources at the CB/NT site. It also describes a systematic approach to determine when source control is sufficient to begin sediment cleanup activities. A brief description of the CB/NT site is provided below, followed by a description of the objectives and organization of this report.

1.1 COMMENCEMENT BAY NEARSHORE/TIDEFLATS SUPERFUND SITE—CLEANUP APPROACH

The CB/NT Superfund site is located in Tacoma, Washington, and encompasses an active seaport and 10–12 square miles of shallow water shoreline and adjacent land, most of which is developed and industrialized (Figure 1). The CB/NT remedial investigation (RI), completed in 1985 (Tetra Tech 1985), and the CB/NT feasibility study (FS), completed in 1989 (Tetra Tech 1988), were conducted by Ecology through a cooperative agreement with EPA. A Record of Decision (ROD) for the site was finalized in September 1989 (U.S. EPA 1989). As outlined in the ROD, the overall cleanup goal for the site is to achieve sediment quality in the bay that will support a healthy marine environment and will reduce the risk of eating contaminated seafood from the bay. The ROD sets forth a strategy and schedule for cleanup of the site.

The CB/NT site includes eight problem areas (Figure 1). Each problem area is characterized in the ROD according to contaminated marine sediments and facilities or sites on land that are suspected sources of contaminants to the sediments. In the RI and FS, specific contaminants in sediments in each problem area are identified as problem chemicals. Each problem area is typically cleaned up independent of the other, using a two-phase approach that is defined in EPA's ROD for the site.



1.1.1 First Cleanup Phase—Source Control (Operable Unit 05)

Ecology has been identified as the lead agency for source identification and source control. Source control is defined as those efforts that are taken to eliminate or reduce, to the extent practicable, the release of contaminants from a site or facility to a problem area. Source control efforts initially focus on identifying the facilities or sites that may release contaminants, and determining whether those facilities or sites are potential or confirmed ongoing sources of problem chemicals. After identifying an ongoing source, regulatory mechanisms and cleanup measures are implemented to control the release of contaminants to the marine environment and to ensure compliance with environmental regulations. Source identification and source control efforts do not focus on historical sources that have already ceased discharges of contaminants to the environment, except as required by ongoing monitoring programs.

1.1.2 Second Cleanup Phase—Sediment Cleanup (Operable Unit 01)

EPA has been identified as the lead agency for sediment cleanup activities. Sediment cleanup activities include sediment remedial design (e.g., sediment studies to identify the type of remedial action to occur), followed by sediment remediation (e.g., confinement of contaminated sediments, natural recovery of sediments, long-term monitoring of sediments). Options for confinement of contaminated sediments include capping sediments in place or dredging and relocating sediments for confined aquatic disposal, nearshore disposal, or upland disposal. The ability to implement sediment cleanup and maintain the sediment quality objectives defined in the ROD is linked to the successful implementation of source control. Sediment cleanup activities in a problem area will only be initiated after source control has been implemented to the extent, or to the extent practicable, that sediments are unlikely to become recontaminated. The sediment cleanup objectives, which are defined in the ROD by apparent effects threshold (AET) values, are shown in Table 1.

The relationships between key elements of source control and sediment actions that are relevant to implementing the CB/NT cleanup plan are set forth in the ROD and are summarized in Figure 2. Building on those relationships, EPA and Ecology have developed a management approach that allows source control and sediment remedial actions to proceed as quickly as possible.

Administratively defined milestones are used in this management approach to link completion of specific source control actions to initiation of sediment actions. Completion of each milestone for source control provides useful information to EPA regarding schedules and strategy for implementing sediment remedial design and sediment remedial action. To adhere to schedules established for sediment remedial actions, it may be necessary for certain sediment remedial design activities to occur simultaneously with source control activities.

TABLE 1. SEDIMENT CLEANUP OBJECTIVES

Chemical	Sediment Cleanup Objective
Metals (mg/kg dry weight; ppm)	
Antimony	150 ^
Arsenic	57 °
Cadmium	5.1 ⁸
Copper	390 ^L
Lead	450 °
Mercury	0.59 ^L
Nickel	>140 👫
Silver	6.1 ^
Zinc	410 *
Organic Compounds (µg/kg dry weight; ppb)	
Low Molecular Weight Polycyclic Aromatic Hydrocarbons (LPAH)	5,200 ^L
Naphthalene	2,100 L
Acenaphthylene	1,300 👫
Acenaphthene	500 L
Fluorene	540 ^L
Phenanthrene	1,500 ^L
Anthracene	960 ^L
2-Methylnaphthalene	670 ^L
High Molecular Weight PAH (HPAH)	17,000 ^L
Fluoranthene	2,500 ^L
Pyrene	3,300 '
Benz(a)anthracene	1,600 ^L
Chrysene	2,800 L
Benzofluoranthenes	3,600 ^L
Benzo(a)pyrene	1,600 ^L
Indeno[1,2,3-cd]pyrene	690 ^ι
Dibenz(a,h)anthracene	230 ^L
Benzo[ghi]perylene	720 ^L
Chlorinated Organic Compounds	
1,3-Dichlorobenzene	170 AL
1,4-Dichlorobenzene	110 *
1,2-Dichlorobenzene	50 ^{L,8}
1,2,4-Trichlorobenzene	51 ^
Hexachlorobenzene (HCB)	22 *
Total Polychlorinated Biphenyls (PCBs)	150°
	(1,000 *)

TABLE 1. (cont.)

Chemical	Sediment Cleanup Objective
Phthalates	
Dimethyl phthalate	160 ^L
Diethyl phthalate	200 8
Di-n-butyl phthalate	1,400 AL
Butyl benzyl phthalate	900 👫
Bis[2-ethylhexyl]phthalate	1,300 •
Di-n-octyl phthalate	6,200 •
Phenois	
Phenol	420 ^L
2-Methylphenol	63 AL
4-Methylphenol	670 ^L
2,4-Dimethylphenol	29 ^ι
Pentachlorophenol	360 ^
Miscellaneous Extractable Compounds	
Benzyl alcohol	73 ¹
Benzoic acid	650 ^{ús}
Dibenzofuran	540 ^L
Hexachlorobutadiene	11 8
N-nitrosodiphenylamine	28 *
Volatile Organic Compounds	
Tetrachloroethene	57 4
Ethylbenzene	10 •
Total xylenes	40 *
Pesticides	
p,p'-DDE	9 •
p,p'-DDD	16 *
p,p'-DDT	34 •

^{*}Lowest apparent effects threshold among amphipod, oyster, and benthic infauna:

- A amphipod mortality bioassay
- L oyster larvae abnormality bioassay
- B benthic infauna
 - The sediment quality objective for human health has been established at 150 ppb for PCBs at the Commencement Bay Nearshore/Tideflats site, according to a method combining equilibrium partitioning and risk assessment methods.

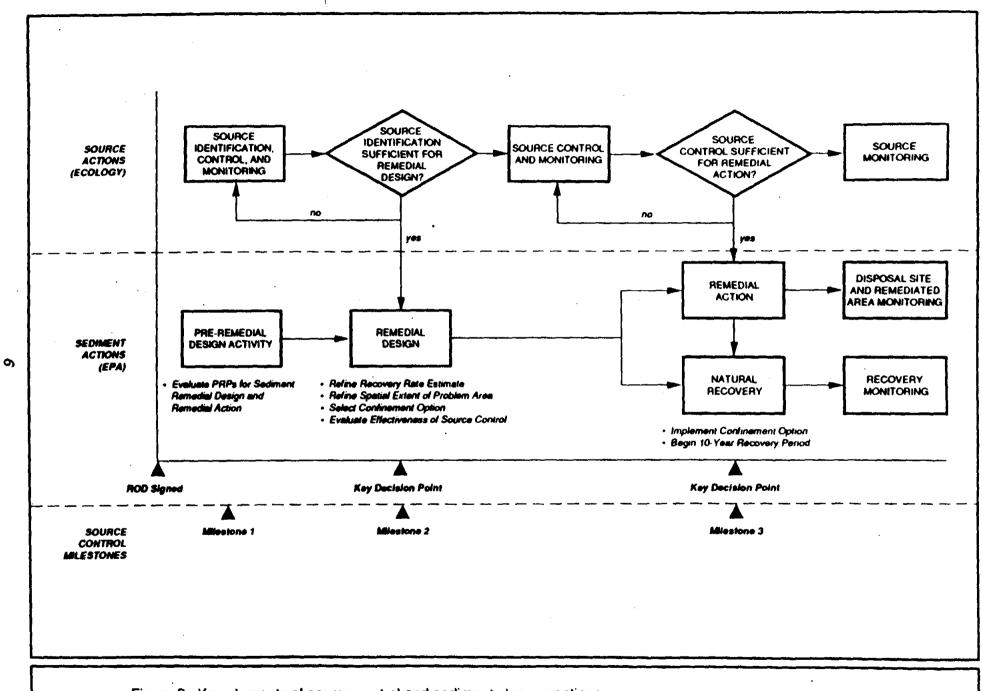


Figure 2. Key elements of source control and sediment cleanup actions.

Several important issues should be kept in mind when considering the source control strategy presented in this report. The agencies have developed this approach to achieve source control objectives defined in the CB/NT ROD. While the approach incorporates methods to identify and control potential sources and to evaluate the effectiveness of source control actions, the scope and complexity of the site require that best professional judgment be judiciously applied throughout the process. It is essential that the flexibility to refine and adjust levels of source control (based on long-term monitoring results) be incorporated into all source control and sediment remedial actions within the site. Finally, throughout the source control process, new sources and problem chemicals may be identified at any time that could affect the source control milestones and alter both the source control and sediment remediation schedules.

1.2 PURPOSE

The purposes of this report are as follows:

- To present the overall strategy for implementing source control at the CB/NT site
- To provide a brief overview of existing source identification and source control activities being performed by Ecology and other agencies at the CB/NT site
- To describe the mechanism for tracking and reporting source identification and source control activities in each problem area
- To define an approach that may be used by Ecology and EPA to assess completeness of source identification and source control in each problem area and to link source control actions with sediment cleanup activities (including both sediment remedial design and sediment remedial action) in each problem area.

1.3 REPORT ORGANIZATION

Source identification and source control activities being performed by Ecology, EPA, Tacoma-Pierce County Health Department (TPCHD), and the City of Tacoma are discussed in Section 2.0. Section 2.0 also describes the mechanism used by Ecology to track and report source identification and source control activities in each problem area. Section 3.0 describes the approach developed by EPA and Ecology to integrate source control actions with sediment cleanup actions in each problem area at the site. This section describes the specific source control tracking milestones that were developed and discusses the importance of long-term source control and sediment monitoring.

Appendices to this report contain information relevant to source control and sediment cleanup at the site. Appendix A includes a copy of the source control and sediment

remediation schedules defined in the ROD (U.S. EPA 1989). It also includes a copy of Section 2 of the integrated action plan (PTI 1988), which provides an overview of the regulatory programs that are active in Commencement Bay. The general types of sources that have been identified in Commencement Bay are described in Appendix B. The 1992 EPA/Ecology Cooperative Agreement is provided in Appendix C. Available methods for characterizing sources are described in Appendix D. An example of Ecology's Source Control Completion Report (for St. Paul Waterway) is provided in Appendix E.

2. SOURCE IDENTIFICATION AND SOURCE CONTROL

This section describes source identification and source control activities in Commencement Bay. General types of contaminant sources in Commencement Bay are summarized in Section 2.1, and agency responsibilities for source identification and control are briefly summarized in Section 2.2. In Section 2.3, an overview of historical and current source identification efforts is provided, and Ecology's tracking and screening process for source identification is described. Section 2.4 describes source control methods and summarizes applicable enforcement mechanisms. Ecology's requirements for reporting the status of source identification and source control at the site to EPA are described in Section 2.5.

Since completion of the RI in 1985, the identification and control of contaminant sources has been recognized as the first step in cleaning up the CB/NT site. In each problem area, ongoing sources must be identified and controlled for the following reasons:

- To eliminate or reduce the release of toxic chemicals
- To prevent ongoing degradation of marine sediments
- To achieve and maintain the sediment quality objectives defined in the ROD
- To enable natural recovery of sediments
- To prevent sediment recontamination once a problem area is remediated
- To ensure the long-term suitability and success of habitat restoration in selected marine areas.

Source identification and source control is a complicated process because of the large number and variety of sources at the site and the varying status of sources (e.g., historical, ongoing, increasing, decreasing).

2.1 TYPES OF SOURCES

At the CB/NT site, the different types of sources can be described by the following attributes:

- Permitted or unpermitted discharge
- Point or nonpoint (area) source
- Variable or steady discharge

- Passive (inadvertent) or active (deliberate) discharge
- Direct or indirect source.

General categories of sources are described below:

- Spills and Inappropriate Management Practices—Spills are unpermitted sources that can be either point or area sources, may enter the waterway through a variety of pathways, are typically intermittent, and are typically an inadvertent discharge.
- Leaks—Leaks of hazardous substances from tanks, lines, process operations, or containment structures typically result in releases to soil, groundwater, and/or surface water.
- Waste Piles, Landfills, and Impoundments—These sources are typically concentrated sources of contaminants that may be released via soil erosion or secondary pathways, such as storm water runoff or leaching to groundwater.
- Storm Drains, Ditches, Creeks, and Storm Water Runoff—Storm water runoff is typically considered a nonpoint source of pollution, even though it is usually collected and routed to nearby surface waters via storm drains, ditches, or pipes (i.e., point source discharges). Storm water runoff may also be an area source when it directly enters the waterway. Nonpoint surface water pollution is generated when storm water comes into contact with pollutants that have accumulated on the land surface. Illegal discharges to storm drains, ditches, and creeks may also cause contamination. Contaminated sediments that collect in storm drains, ditches, or creeks may also impact sediments in the waterways.
- Effluent Outfalls—Effluent outfalls are typically active discharges that are known sources and are often ongoing rather than intermittent. National Pollutant Discharge Elimination System (NPDES) permits are required for wastewater discharges.
- Groundwater Discharge—Groundwater may enter the waterway as an area source (e.g., seeps along the bank of a waterway) or may infiltrate storm drains that discharge to waterways.

Additional information on these categories of sources is provided in Appendix B.

2.2 AGENCY RESPONSIBILITIES

Source control activities at the site are conducted primarily by Ecology, using state water quality and state hazardous waste cleanup authorities. Since June 1989, through a

cooperative agreement with EPA, the Ecology Commencement Bay Urban Bay Action Team (UBAT) has been designated as the lead for source control. The Commencement Bay UBAT is part of the Toxics Cleanup Program at Ecology's Southwest Regional Office in Olympia, Washington. This UBAT is currently comprised of nine members, with funding for those positions shared by Ecology and EPA.

The Commencement Bay UBAT was formed to enhance source control activities at the site. The UBAT's primary functions are to identify and investigate sources of contaminants to the Superfund waterways of Commencement Bay, to utilize enforcement authorities to achieve source control, and to manage these and other efforts in accordance with the EPA/Ecology Cooperative Agreement. UBAT activities include performing site inspections, collecting environmental samples for analysis, issuing administrative actions (e.g., orders, consent decrees, and permits), and performing technical oversight of cleanup actions.

In addition to implementing source control in each problem area, the UBAT's responsibilities include coordinating all Superfund-related source control activities at the site. These coordination efforts are to ensure, to the maximum extent practicable, that Superfund-related source control activities developed by non-UBAT personnel are as consistent as possible with the cleanup plan described in the ROD. The UBAT coordinates source control efforts initiated by Ecology's Industrial Section, Spill Response Section, Sediment Management Unit, Water Quality Program, and Solid and Hazardous Waste Program, as well as those efforts initiated by the City of Tacoma and TPCHD. Ecology tracks source control efforts initiated by EPA's Superfund Branch (e.g., Puyallup Land Settlement Property Transfers), Response/Investigation Section, and Resource Conservation and Recovery Act (RCRA) Branch. A summary of active regulatory programs at the site is provided in the integrated action plan (PTI 1988) and in Section 3.2 of the ROD (U.S. EPA 1989). Section 2 of the integrated action plan is reproduced here in Appendix A.

The UBAT's coordination effort also includes participation in the CB/NT Technical Discussion Group (TDG) meetings, which are held every 3 months in Tacoma. At TDG meetings, updates on the status of source control actions at the site are provided to interested agency personnel and members of the affected community. The UBAT also sponsors agency meetings, which are held every 2 months, for personnel with source control responsibilities to share information on source-related activities among representatives from various Ecology programs, City of Tacoma Planning Department Building and Land Use Services Division, City of Tacoma Sewer Utility Division, TPCHD Commencement Bay Water Quality Program, Puyallup Tribe, and EPA's Superfund Branch. These UBAT-sponsored meetings are not open to the public because enforcement-confidential information on facilities is discussed.

Schedules for implementing source identification and source control in each problem area are described in Appendix C of the ROD (U.S. EPA 1989) and are reproduced here in Appendix A. Although source control activities are currently underway in all eight

problem areas, efforts are prioritized to meet the ROD schedules. Thus, source control efforts are focused on one or two problem areas at a time, in the following order: St. Paul Waterway, Sitcum Waterway, Mouth of Hylebos Waterway, Head of Hylebos Waterway, Wheeler-Osgood Waterway, Mouth and Head of Thea Foss Waterway, and Middle Waterway. Source control implementation schedules are reviewed each year by Ecology and EPA. In January of each year, Ecology submits a draft Source Control Annual Report to EPA that includes any recommended changes to the source control implementation schedules. By June of each year, the report is submitted to EPA for final approval.

In support of the cleanup plan for the CB/NT site, numerous reports have been produced that include information on source control activities at the CB/NT site. To assist individuals new to this project, reports that contain information on source control are summarized in Table 2. These documents will be referenced in the following sections and may be consulted for more detailed information.

2.3 SOURCE IDENTIFICATION

As the first step in implementing source control, the potential ongoing sources of contaminants must be identified. Historical and current efforts to identify sources at the CB/NT site are described in the following sections.

2.3.1 Historical Source Identification Activities

In Commencement Bay, numerous historical and ongoing sources were identified during the RI (Tetra Tech 1985; Sections 6 and 7); the subsequent source evaluation phase of the FS (Tetra Tech 1986b; Sections 1-8); the final FS (Tetra Tech 1988; Sections 5-12); and the integrated action plan (PTI 1988) [see Table 2]. These source identification efforts primarily focused on identifying sources of problem chemicals to the waterways. This information was obtained through evaluating past and present land use and associated potential contaminant releases, interpreting results of sediment sampling data collected during the RI and previous investigations, and reviewing available water quality data collected by Ecology, EPA, TPCHD, City of Tacoma Sewer Utility Division, and specific industries. During the RI and FS, these source identification efforts were supplemented by investigations and inspections conducted by Ecology, EPA, TPCHD, City of Tacoma; by the potentially responsible party (PRP) search conducted by EPA; and by voluntary investigations conducted by owners or operators of facilities.

As part of the RI and FS, sediment data were used to define the problem areas at the site and to identify the specific contaminants that are considered "problem chemicals" in sediments in each problem area (see p. 49 of the ROD). The eight problem areas that were defined at the site are shown in Figure 1, and the contaminants that were identified as problem chemicals in each of those eight problem areas are shown in Tables 3-10

TABLE 2. DOCUMENTS CONTAINING INFORMATION ON SOURCE CONTROL AT THE COMMENCEMENT BAY NEARSHORE/TIDEFLATS SUPERFUND SITE

Study/Author **Document Description** CB/NT Remedial Investigation The process used to define problem areas at the site and to (Tetra Tech 1985) identify the contaminants in each problem area is described in Section 6.5 (page 6.31). Table 6.14 lists the potential problem chemicals in each problem area and categorizes those chemicals as Priority 1, 2, or 3 problem chemicals. Information on the major contaminant sources identified for each problem area, including specific information on the sources of most Priority 1 problem chemicals, is provided in Section 7 of the RI report. Recommendations for source control activities are also provided in Section 7. CB/NT Feasibility Study, Source evaluations for 30 problem chemicals or chemical groups Source Evaluation Refinement were conducted during this task of the FS. The report describes (Tetra Tech 1986b) all problem chemicals that were identified, but not dealt with, in the RI li.e., most of the sources of problem chemicals that are evaluated in the RI were sources of Priority 1 problem chemicals, and the sources of problem chemicals that are evaluated in this FS report are sources of Priority 2 and 3 problem chemi-CB/NT Feasibility Study, This study was undertaken to evaluate the effect of source Assessment of the Potential control actions on sediment contaminant concentrations in each Success of Source Control. of the problem areas. Information on the relationship between Draft Report (Tetra Tech. source loading and sediment accumulation of problem chemicals October 1987) is presented. The degree of source control required to attain acceptable levels in an acceptable timeframe and the degree of source control required to effect recovery in the long term are estimated. This information was incorporated into the CB/NT feasibility study report (Tetra Tech 1988). CB/NT Integrated Action Plan. The integrated action plan was developed as a framework for Public Review Draft (PTI 1988) scheduling and planning both source control and sediment remedial action at the CB/NT site. The plan, which relies heavily on information presented in the RI and FS reports, provides a summary of active regulatory programs at the site. It also provides priority rankings for source control in each problem area according to environmental significance, potential effectiveness of source control, and status of ongoing source control actions. Major sources in each problem area, as well as implementation schedules for source control and remedial action in each problem area, were first defined in this report. An appendix to this report describes sampling and analytical guidance for sediment volume refinement and long-term monitoring. The integrated action plan was issued for public review along with the RI/FS as one of the principal CB/NT documents, and information from the plan was incorporated into the ROD. Because

issued.

information was incorporated into the ROD, a final plan was not

Study/Author Record of Decision

Document Description

CB/NT Record of Decision (U.S. EPA 1989)

The ROD describes the selected remedy for cleanup of the site. Section 3.2 discusses major source control programs, and Sections 3.5, 5.2, and 8.2.2 provide schedules and information on coordination efforts for source control activities. Information on sediment and source characteristics in each problem area is summarized in Section 6 (essentially, this section provides a summary of the extensive source identification efforts presented in the RI and FS). Source control objectives, in terms of implementing applicable or relevant and appropriate requirements (ARARs), are described in Sections 2.4.3, 8.2.2, and 10.2.2. Sediment cleanup objectives are described in Sections 2.4.3, 7.2.4, and 10.2.4. Appendix C of the ROD includes implementation schedules for source control and sediment remedial action (reproduced here in Appendix A).

EPA/Ecology Cooperative Agreement (Annual)

The EPA/Ecology Cooperative Agreement is awarded to Ecology in January of each year. A copy of the 1992 Cooperative Agreement is reproduced in Appendix C of this report. The primary objectives of the agreement are to enhance source control efforts at the site through funding of the Commencement Bay UBAT and to maintain coordination between EPA and Ecology during implementation of site cleanup, including source control and sediment remediation efforts. The Cooperative Agreement describes Ecology's enforcement strategy and defines Ecology's source control reporting requirements to EPA. As deliverables under the Cooperative Agreement, Ecology submits an annual report that describes source control activities to be conducted in the following year. On a quarterly basis, Ecology provides an update of the status of source control activities in each problem area. The 1991 Cooperative Agreement awarded Ecology \$300,000; the 1992 Cooperative Agreement awarded Ecology \$360,000.

TABLE 3. PROBLEM CHEMICALS IN ST. PAUL WATERWAY

Priority*	Chemical
Priority 1	4-Methylphenol
Priority 2	Phenol ^b
	2-Methoxyphenol ^e
	1-Methyl-2-(methylethyl) benzenes
	Benzyl alcohol
	2-Methylphenol
Priority 3	Naphthalene ⁴
	2-Methylnaphthalene ^d
	Biphenyl*
	Retene ^c
	Diterpenoid hydrocarbons ^c
	Nickel
	Total organic carbon
	Total volatile solids

Priority 1 problem chemical—Detected at concentrations exceeding apparent effects thresholds, and the spatial distribution of this chemical corresponds to gradients of observed toxicity or benthic effects.

Priority 2 problem chemical—Detected at concentrations exceeding apparent effects thresholds at more than one station, but shows no particular spatial relationship with gradients of observed toxicity or benthic effects.

Phenol was identified as a Priority 3 chemical in the remedial investigation (p. 6.34), but was revised to a Priority 2 chemical in Tetra Tech (1986b) (p. 111 of Section 6.3).

^{*} The Record of Decision does not include a CB/NT cleanup objective for this constituent.

^{*}Naphthalene and 2-methylnaphthalene were the only two low molecular weight polycyclic aromatic hydrocarbon (LPAH) compounds identified as Priority 3 chemicals in the remedial investigation (Section 7.4), although some text broadly refers to "LPAH" compounds as Priority 3 chemicals (e.g., p. 6.34 of Tetra Tech (1985) and p. 111 of Tetra Tech (1986b)].

TABLE 4. PROBLEM CHEMICALS IN SITCUM WATERWAY

Priority*	Chemical
Priority 1	••
Priority 2	Arsenic
	Copper
· ·	Lead
	Zinç
Priority 3	LPAH
	НРАН
	Alkylated benzene isomer ^{b,c}
	Diterpenoid hydrocarbon ^e
	N-nitrosodiphenylamine
	Dibenzofuran

Priority 1 problem chemical—Detected at concentrations exceeding apparent effects thresholds, and the spatial distribution of this chemical corresponds to gradients of observed toxicity or benthic effects.

Priority 2 problem chemical—Detected at concentrations exceeding apparent effects thresholds at more than one station, but shows no particular spatial relationship with gradients of observed toxicity or benthic effects.

In Tetra Tech (1986b) (p. 103), the alkylated benzene isomer was tentatively identified as a cymene isomer (e.g., 1-methyl[4-methylethyl]benzene and 1-methyl[2-methylethyl]benzene).

^{*} The Record of Decision does not include a CB/NT cleanup objective for this constituent.

TABLE 5. PROBLEM CHEMICALS IN HEAD OF HYLEBOS WATERWAY

Priority*	Chemical
Priority 1	PCBs
	НРАН
	Arsenic
	Zinc
Priority 2	Copper
	Antimony
	Lead
	Nickel
	Mercury
	Tetrachloroethene
	Phenol
Priority 3	Methylpyrene ^{b,c}
	Methylphenanthrene ^{b,c}
	Dibenzothiophene ^{b, c}
	Ethylbenzene
	Xylene
	Chlorinated benzenes
	Chlorinated butadienes
•	Bis[2-ethylhexyl]phthalate ⁴
	Benzyl alcohol
	Alkylated benzene isomer ^{b.c.e}

Note: The Head of Hylebos Problem Area is comprised of Segments 1 and 2 as described in Tetra Tech (1985) (see Figure 12 of the Record of Decision).

 Priority 1 problem chemical—Detected at concentrations exceeding apparent effects thresholds, and the spatial distribution of this chemical corresponds to gradients of observed toxicity or benthic effects.

Priority 2 problem chemical—Detected at concentrations exceeding apparent effects thresholds at more than one station, but shows no particular spatial relationship with gradients of observed toxicity or benthic effects.

- * Additional information on these tentatively identified compounds is discussed on pp. 41~52 of Tetra Tech (1986b).
- * The Record of Decision does not include a CB/NT cleanup objective for this constituent.
- ^a Bis [2-ethylhexyl]phthalate was the only phthalate ester identified as a Priority 3 chemical for the Head of Hylebos Problem Area in Tetra Tech (1986b) (pp. 28-34), although some text broadly refers to "phthalate esters" as Priority 3 chemicals (e.g., p. 6.34 of Tetra Tech (1985) and p. 19 of Tetra Tech (1986b)].
- In Tetra Tech (1986b) (p. 21), the alkylated benzene isomer was tentatively identified as a cymene isomer (e.g., 1-methyl[4-methylethyl]benzene and 1-methyl[2-methylethyl]benzene).

TABLE 6. PROBLEM CHEMICALS IN MOUTH OF HYLEBOS WATERWAY

Priority*	Chemical
Priority 1	PCBs
Priority 2	Hexachlorobenzene
	Trichloroethene ^b
	Tetrachloroethene
	1,2-Dichlorobenzene
	1,3-Dichlorobenzene
	Hexachlorobutadiene
	Pentachlorocyclopentane isomer ^{b,c}
	Lead
Priority 3	HPAH
	LPAH
	Methylphenanthrene ^{b.d.e}
	Methylpyrene ^{b.d.}
	Biphenyl ^{b.}
	Phenol
	Benzyl alcohol
	Copper
	Zinc
	Mercury

 Priority 1 problem chemical—Detected at concentrations exceeding apparent effects thresholds, and the spatial distribution of this chemical corresponds to gradients of observed toxicity or benthic effects.

Priority 2 problem chemical—Detected at concentrations exceeding apparent effects thresholds at more than one station, but shows no particular spatial relationship with gradients of observed toxicity or benthic effects.

- ^b The Record of Decision does not include a CB/NT cleanup objective for this constituent.
- ^c The pentachlorocyclopentane isomer, a tentatively identified compound, is discussed in Tetra Tech (1985) (p. 7.73).
- ⁴ Methylphenanthrene and methylpyrene were not listed as Priority 3 chemicals in Tetra Tech (1985) (Table 6.14, p. 6.35) or Tetra Tech (1986b); however, supporting text in the latter report (pp. 48-52) identifies these two compounds as Priority 3 chemicals.
- * Additional information on these tentatively identified compounds is discussed on pp. 41-52 of Tetra Tech (1986b).

TABLE 7. PROBLEM CHEMICALS IN WHEELER-OSGOOD WATERWAY

Priority*	Chemical
Priority 1	•
Priority 2	Total organic carbon
	LPAH
	HPAH
	Biphenyt ^b
	Phenol
	4-Methylphenoi ^b
	1,2-Dichlorobenzene
	N-nitrosodiphenylamine
	Zinc
	Copper
	Lead
	Cadmium
Priority 3	

Note: The Wheeler-Osgood Problem Area is comprised of Segment 2 as described in Tetra Tech (1985) (see Figure 12 of the Record of Decision).

 Priority 1 problem chemical—Detected at concentrations exceeding apparent effects thresholds, and the spatial distribution of this chemical corresponds to gradients of observed toxicity or benthic effects.

Priority 2 problem chemical—Detected at concentrations exceeding apparent effects thresholds at more than one station, but shows no particular spatial relationship with gradients of observed toxicity or benthic effects.

Priority 3 problem chemical—Detected at concentrations exceeding apparent effects thresholds at only one station in a problem area or is the highest recorded concentration of that chemical in the Puget Sound database.

* The Record of Decision does not include a CB/NT cleanup objective for this constituent.

TABLE 8. PROBLEM CHEMICALS IN HEAD OF THEA FOSS (CITY) WATERWAY

Priority ^a	Chemical
Priority 1	Total organic carbon
	Zinc .
	Lead
	Mercury
Priority 2	Oil and grease
	LPAH
	HPAH
	Cadmium
	Nickel
	2-Methylphenol
	4-Methylphenol ^b
	Bis[2-ethylhexyl]phthalate ^c
	Butyl benzyl phthalate ^c
	Copper
Priority 3	1,4-Dichlorobenzene
	N-nitrosodiphenylamine
	Aniline ^b
	Benzyl alcohol
	Phenol ^d

Note: The Head of Thea Foss (City) Problem Area is comprised of Segment 1 as described in Tetra Tech (1985) (see Figure 12 of the Record of Decision).

Priority 1 problem chemical—Detected at concentrations exceeding apparent effects thresholds, and the spatial distribution of this chemical corresponds to gradients of observed toxicity or benthic effects.

Priority 2 problem chemical—Detected at concentrations exceeding apparent effects thresholds at more than one station, but shows no particular spatial relationship with gradients of observed toxicity or benthic effects.

^b The Record of Decision does not include a CB/NT cleanup objective for this constituent.

^c Bis[2-ethylhexyl]phthalate and butyl benzyl phthalate are the only two phthalate esters identified as Priority 2 chemicals.

^d Although phenol was not identified as a Priority chemical in Tetra Tech (1985) (p. 6.34) and was identified as a Priority 2 chemical in Tetra Tech (1986b) (p. 159), information presented in Tetra Tech (1985) (p. 4.11, 4.18) suggests that phenol should have been listed in Table 6.14 as a Priority 3 problem chemical. The SEDQUAL database retrieval confirmed this designation.

TABLE 9. PROBLEM CHEMICALS IN MOUTH OF THEA FOSS (CITY) WATERWAY

Priority ⁴	Chemical
Priority 1	
Priority 2	LPAH
	HPAH
Priority 3	Dibenzothiophene ^b
	Phenol
	Biphenyl ^b
	Zinc
	Mercury ^c
	PC8s

Note: The Mouth of Thea Foss (City) Problem Area is comprised of Segment 3 as described in Tetra Tech (1985) (see Figure 12 of the Record of Decision).

Priority 1 problem chemical—Detected at concentrations exceeding apparent effects thresholds, and the spatial distribution of this chemical corresponds to gradients of observed toxicity or benthic effects.

Priority 2 problem chemical—Detected at concentrations exceeding apparent effects thresholds at more than one station, but shows no particular spatial relationship with gradients of observed toxicity or benthic effects.

b The Record of Decision does not include a CB/NT cleanup objective for this constituent.

^c Mercury was not listed as a Priority chemical in Tetra Tech (1985) (Table 6.14, p. 6.34); however, supporting text in Tetra Tech (1986b) (p. 180) identified mercury as a Priority 3 chemical.

TABLE 10. PROBLEM CHEMICALS IN MIDDLE WATERWAY

Priority ^a	Chemical
Priority 1	
Priority 2	Copper
	Mercury
Priority 3	Arsenic
	Zinc
	Lead
	LPAH
	HPAH
	Diterpenoid hydrocarbons ^{b,c}
	Dibenzothiophene ^{b,c}
	4-Methylphenol ^b
	Methylpyrenes ^{b,c}
	Dichlorobenzenes
	Phenol
	Pentachlorophenol

Priority 1 problem chemical—Detected at concentrations exceeding apparent effects thresholds, and the spatial distribution of this chemical corresponds to gradients of observed toxicity or benthic effects.

Priority 2 problem chemical—Detected at concentrations exceeding apparent effects thresholds at more than one station, but shows no particular spatial relationship with gradients of observed toxicity or benthic effects.

^b The Record of Decision does not include a CB/NT cleanup objective for this constituent.

c Additional information on these tentatively identified compounds is discussed on pp. 138–145 of Tetra Tech (1986b).

The sources of problem chemicals to a problem area were identified from available information on the basis of one or more of the following criteria:

- Proximity of potential sources to sediment contamination
- Horizontal and vertical gradients of sediment contamination
- Known or suspected use of contaminants by potential party(s)
- Evidence of discharge and estimated loading rates of contaminants into the environment.

To prioritize source control activities within a problem area, information presented in the RI and FS reports was also used to assign a priority to each problem chemical identified for a problem area. Each problem chemical was assigned either Priority 1, 2, or 3 on the basis of its correlation with observed biological effects and according to the number of stations in the problem area where sediment chemical concentrations exceeded an AET value. The low AET was adopted in the ROD as the sediment cleanup objective (a detailed discussion of AET values is provided in Section 7.2.4 of the ROD). The criteria used to assign priority values to problem chemicals are provided in the footnotes to Tables 3-10 of this report and are described in detail in the ROD (p. 50).

NOTE TO THE READER: The terms "problem chemicals" and "Priority 1, 2, or 3 problem chemicals" refer to the same list of chemicals (i.e., each problem chemical is defined as either a Priority 1, 2, or 3 problem chemical). These terms should not be confused with the term "indicator chemical." The term "indicator chemical" was defined in the CB/NT FS report, and it only refers to two or three of the problem chemicals in a problem area. These indicator chemicals were used to develop and evaluate sediment cleanup alternatives for a specific problem area. The spatial distribution of the indicator chemicals was used to estimate the volume of sediments exceeding the sediment quality objectives in the FS and to estimate the effects of source control and natural recovery. All Priority 1, 2, and 3 problem chemicals, not just indicator chemicals, are used for source identification activities.

2.3.2 Current Source Identification Activities

As established during the RI/FS, current source identification activities at the CB/NT site continue to focus on identifying and controlling those sites and facilities that are ongoing sources of problem chemicals to a problem area. Since completion of the ROD, the Commencement Bay UBAT has been systematically inspecting facilities and sites associated with problem areas to identify potential ongoing sources of problem chemicals to problem areas.

Source identification efforts include the evaluation of historical and new information on sites and facilities gained through inspections and environmental sampling efforts conducted by or under the authorities of Ecology, EPA, TPCHD, and City of Tacoma; review of voluntary cleanup action reports; evaluation of responses to EPA Superfund information request letters; and interviews via civil investigators. Efforts focus on evaluating the types of contaminants that may be associated with a site or facility and identifying potential pathways for that contaminant to be released to the marine environment.

In 1990, the Commencement Bay UBAT developed the following process to track and report source identification efforts and to ultimately identify confirmed ongoing sources of problem chemicals to each problem area.

2.3.3 Potential Source Identification Activities for "New" Problem Chemicals

Although source identification efforts focus on problem chemicals defined during the RI and FS, "new" problem chemicals in sediments may be identified based on results of future sampling efforts. Potential "new" problem chemicals are identified during sediment remedial design activities because EPA requires that sediments be analyzed for numerous chemicals, not just the problem chemicals that were identified for that problem area. EPA requires, at a minimum, that all surface and subsurface sediment samples be analyzed for those constituents shown in Table 11. Analyses for the constituents in Table 11 will allow for comparisons of the results to CB/NT sediment cleanup objectives (Table 1), State of Washington Sediment Management Standards, and the Puget Sound Dredged Disposal Analysis (PSDDA) program screening level and maximum level values. At a minimum, EPA requires that new sediment data be compared to CB/NT sediment cleanup objectives and that potential "new" problem chemicals be identified. During sediment remedial design, EPA also requires that a certain number of surface samples be analyzed for the full suite of chemicals on the EPA target analyte list (Table 12).

The identification of "new" problem chemicals must be integrated into the CB/NT source control strategy. For example, mercury is not a problem chemical for Sitcum Waterway, and, thus, potential sources of mercury to Sitcum Waterway are not scheduled to be investigated by Ecology. However, if the results of sediment remedial design studies in Sitcum Waterway show that mercury concentrations in surface sediments exceed the ROD sediment cleanup objectives, then the sediment remedial design evaluation study must identify that issue as early as possible upon receipt of data and recommend whether potential source evaluations are necessary. If EPA concurs that additional source control evaluations are necessary, then EPA will notify Ecology that "new" problem chemicals have been identified for Sitcum Waterway, and Ecology will evaluate whether essential source control has been completed for sources of mercury to Sitcum Waterway. Ecology may focus their efforts on identifying ongoing sources of "new" problem chemicals, and

TABLE 11. TARGET ANALYTES FOR SEDIMENT REMEDIAL DESIGN

Conventional/Miscellaneous

Total solids

Total volatile solids

Total organic carbon

Ammonia

pН

Sulfide

Metals

- Antimony
- Arsenic
- Cadmium
 - Chromium^b
- Copper
- Lead
- Mercury
- Nickel
 - Silver
- * Zinc

Tributyltin^e

Phenois and Substituted Phenois

- Phenol
- 2-Methylphenol
- 4-Methylphenol
 - 2,4-Dimethylphenol
- Pentachlorophenol

LPAH

Naphthalene

2-Methylnaphthalene

Acenaphthylene

Acenaphthene

Fluorene

Phenanthrene

Anthracene

Total LPAH

HPAH

Fluoranthene

Pyrene

Benzia)anthracene

Chrysene

Benzo[b]fluoranthene

Benzo(k)fluoranthene

Benzo(a)pyrene

Indeno[1,2,3-cd]pyrene

Dibenz(a,h)anthracene

Benzo(ghi)perylene

Total HPAH

Chlorinated Aromatic Compounds

- 1,3-Dichlorobenzene
- 1,4-Dichlorobenzene
- 1.2-Dichlorobenzene
- 1,2,4-Trichlorobenzene
- Hexachiorobenzene

Volatile Organic Compounds

- Tetrachloroethene
- Trichloroethene^c
- Ethylbenzene
- Total xylenes

Chlorinated Aliphatic Compounds

Hexachlorobutadiene

Phthalate Esters

Dimethyl phthalate

Diethyl phthalate

Di-n-butyl phthalate

- Butylbenzylphthalate
- Bis(2-ethylhexyl)phthalate
 Di-n-octyl phthalate

Other Organic Compounds

- Benzyl alcohol
 - Benzoic acid
- Dibenzofuran
 - Hexachloroethane^e
- N-nitrosodiphenylamine

Pesticides/PCBs

- Total PCBs
 - 4,4'-DDE
 - 4,4'-DDD
 - 4,4'-DDT
 - Aldrin*
 - Chlordanes
 - Dieldrin^e
 - Heptachlor
 - Lindane^e

Tentatively Identified Compounds (TICs)

As determined by U.S. Environmental

Protection Agency (EPA)

Problem Chemicals

As determined by EPA⁴

TABLE 11. (cont.)

- Those constituents marked with an asterisk include all constituents that were identified as problem chemicals at the Commencement Bay Nearshore/Tideflats (CB/NT) site (i.e., each of these constituents appears in at least one of Tables 3–10).
- * The target analyte list includes all constituents that have a CB/NT record of decision (ROD) sediment cleanup objective, a Washington Department of Ecology Sediment Management Standard, or a Puget Sound Dredged Disposal Analysis (PSDDA) screening level (SL) and maximum level (ML) value. CB/NT ROD sediment cleanup objectives are not available for those constituents that are marked with footnote "b" or "c."
- ^b A Washington Department of Ecology Sediment Cleanup Standard exists for chromium.
- FPSDDA SL and ML values exist for this constituent.
- ^d EPA may require analyses of problem chemicals that are specific to a problem area, even if CB/NT sediment cleanup objectives are not available for those problem chemicals (e.g., 2-methoxyphenol is a problem chemical in St. Paul Waterway, but a CB/NT sediment cleanup objective is not available in the ROD).

TABLE 12. U.S. ENVIRONMENTAL PROTECTION AGENCY TARGET ANALYTE LIST

Organic Analyses*

Volatile Compounds

- 1. Chloromethane
- 2. Bromomethane
- 3. Vinyl chloride
- 4. Chloroethane
- 5. Methylene chloride
- 6. Acetone
- 7. Carbon disulfide
- 8. 1,1-Dichloroethene
- 9. 1,1-Dichloroethane
- 10. 1,2-Dichloroethene (total)
- 11. Chloroform
- 12. 1,2-Dichloroethane
- 13. 2-Butanone
- 14. 1.1.1-Trichloroethane
- 15. Carbon tetrachloride
- 16. Bromodichloromethane
- 17. 1,2-Dichloropropane
- 18. cis-1,3-Dichloropropene
- 19. Trichloroethene
- 20. Dibromochloromethane
- 21. 1,1,2-Trichloroethane
- 22. Benzene
- 23. trans-1,3-Dichloropropene
- 24. Bromoform
- 25. 4-Methyl-2-pentanone
- 26. 2-Hexanone
- 27. Tetrachloroethene
- 28. Toluene
- 29. 1,1,2,2-Tetrachloroethane
- 30. Chlorobenzene
- 31. Ethyl benzene
- 32. Styrene
- 33. Total xylenes

Semivolatile Organic Compounds

- 34. Phenol
- 35. bis[-2-Chloroethyl]ether
- 36. 2-Chlorophenol
- 37. 1,3-Dichlorobenzene
- 38. 1,4-Dichlorobenzene
- 39. 1,2-Dichlorobenzene
- 40. 2-Methylphenol
- 41. 2,2'-oxybis[1-Chloropropane]
- 42. 4-Methylphenol
- 43. N-Nitroso-di-n-dipropylamine
- 44. Hexachloroethane
- 45. Nitrobenzene
- 46. Isophorone

- 47. 2-Nitrophenol
- 48. 2,4-Dimethylphenol
- 49. bis[2-Chloroethoxy]methane
- 50. 2,4-Dichlorophenol
- 51. 1,2,4-Trichlorobenzene
- 52. Naphthalene
- 53. 4-Chloroanaline
- 54. Hexachlorobutadiene
- 55. 4-Chloro-3-methylphenol
- 56. 2-Methylnaphthalene
- 57. Hexachlorocyclopentadiene
- 58. 2,4,6-Trichlorophenol
- 50. 2,4,0-Trichlorophieno
- 59. 2,4,5-Trichlorophenol
- 60. 2-Chloronaphthalene
- 61. 2-Nitroanaline
- 62. Dimethylphthalate
- 63. Acenaphthylene
- 64. 2,6-Dinitrotoluene
- 65. 3-Nitroaniline
- 66. Acenaphthene
- 67. 2,4-Dinitrophenol
- 68. 4-Nitrophenol
- 69. Dibenzofuran
- 70. 2,4-Dinitrotoluene
- 71. Diethylphthalate
- 72. 4-Chlorophenyl-phenylether
- 73. Fluorene
- 74. 4-Nitroaniline
- 75. 4,6-Dinitro-2-methylphenol
- 76. N-Nitrosodiphenylamine
- 77. 4-Bromophenyl-phenylether
- 78. Hexachlorobenzene
- 79. Pentachlorophenol
- 80. Phenanthrene
- 81. Anthracene
- 00. 0. ()
- 82. Carbazole
- 83. Di-n-butylphthalate
- 84. Fluoranthene
- 85. Pyrene
- 86. Butylbenzylphthalate
- 87. 3,3'-Dichlorobenzidine
- 88. Benz{a}anthracene
- 89. Chrysene
- 90. bis[2-Ethylhexyl]phthalate
- 91. Di-n-octylphthalate
- 92. Benzo(b)fluoranthene
- 93. Benzo[k]fluoranthene
- 94. Benzo[a]pyrene
- 95. Indeno[1,2,3-cd]pyrene
- 96. Dibenz(a,h)anthracene
- 97. Benzo(ghi)perylene

- Establishing and administering a program for permitting DW and EHW management facilities
- Encouraging recycling, reuse, reclamation, and recovery of DW and EHW to the extent possible.

2.2.3 Resource Conservation and Recovery Act

RCRA establishes a permit system for facilities involved in the treatment, storage, and disposal of hazardous materials. For example, a RCRA Part B permit is required for establishing or operating a hazardous waste disposal site. The permit application must contain a variety of information on the site, such as planned activities and site conditions that may influence the transport and fate of contaminants. Other substantive requirements of RCRA include:

- Performance standards for closure and post-closure activities
- Groundwater protection standards
- Design requirements for landfills
- Use and management of containers, tanks, surface impoundments, and waste piles
- Specifications for land treatment
- Specifications for incinerators.

Substantive specifications of RCRA must be met by all treatment, storage, and disposal facilities proposed for site remediation. Procedural, administrative, and substantive requirements must be met for offsite facilities.

2.2.4 Tacoma-Pierce County Health Department Solid Waste Permit

TPCHD issues permits for the establishment of disposal sites for nonhazardous solid waste in the Tacoma area. Establishment of a solid waste disposal facility requires approval of conditions specified in a TPCHD permit application. The TPCHD permit application for solid waste facilities requires a variety of information, including characterization of the solid waste, site characterization (including hydrogeological characterization), and specifications for site design. TPCHD may issue a permit (usually containing several conditions) after concurrence with Ecology. Remedial activities involving creation of a solid waste disposal facility would be required to meet the substantive requirements of the TPCHD permit process, and if conducted offsite, may be additionally required to meet TPCHD procedural requirements.

2.3 WASTEWATER DISCHARGES

Wastewater discharges are subject to regulation under one of three permit programs discussed in the following sections: 1) National Pollutant Discharge Elimination System, 2) Washington Waste Discharge System, and 3) industrial pretreatment.

2.3.1 National Pollutant Discharge Elimination System

The federal CWA establishes that discharges of wastewater from point sources to surface waters of the United States are illegal unless specifically authorized by a permit. To implement this requirement, the NPDES permit process was created. NPDES permits are issued to all facilities with direct discharges to surface waters, including municipal wastewater treatment plants. In recent years, the scope of NPDES permits has been expanded to include more diffuse discharges such as sandblasting waste from shipyards and ship repair facilities. In addition, recent amendments to the CWA require NPDES permits for certain stormwater discharges (see Section 2.5.1).

In 1973, Ecology was delegated the authority to administer the NPDES permit program in Washington state. Under the NPDES program, EPA has established technology-based numerical effluent guidelines and specific numerical concentration limits for some contaminants. These guidelines are minimum standards. More strict effluent standards can be set if the established standards are not sufficient to meet state water quality standards.

2.3.2 Washington State Waste Discharge Permit

The Washington Waste Discharge Permit Program (173-216 WAC) implements regulations for the discharge of wastewater to surface water, municipal treatment plants, and groundwater. The program excludes discharges regulated by the state Underground Injection Control Program and somewhat overlaps with discharges regulated by NPDES (i.e., NPDES serves as both state and federal permits), or an approved local industrial pretreatment program (i.e., local programs are delegated state permitting authority). Permit conditions are based on all known, available, and reasonable treatment methods but also incorporate provisions of other laws including prohibited discharge requirements (see Section 2.3.3).

2.3.3 Industrial Pretreatment

Commercial and industrial facilities discharging into sanitary sewer systems do not require NPDES permits. These discharges are regulated either by state waste discharge permits (described above) or the federal pretreatment program established under Section 307 of the CWA. The pretreatment program is different from most CWA programs. While the program and permit issuing powers can be delegated to the states (Washington received approval of its application on 30 September 1986), the delegation can go beyond the state level with major regulatory and enforcement functions passing to the municipalities that operate treatment plants.

Notice/Demand Letter--A draft consent order or decree is usually accompanied by a notice or demand letter specifying the time frame and procedures for negotiations. Notice or demand letters can be issued for both source control activities and remedial activities at contaminated sites.

Record of Decision--A ROD is a document prepared by either EPA or Ecology to certify the selection of a remedial alternative for a hazardous waste site under CERCLA or HWCA. The selection of the preferred alternative is based on technical and cost analyses presented in a feasibility study (FS) and on public comment on the FS. The ROD becomes part of the agency's administrative record for a Superfund site and often forms the basis for drafting and issuing consent orders or decrees or administrative orders.

Court Action--Court action can be implemented when other methods of enforcement fail. Court action can be implemented for a variety of reasons (e.g., failure to comply with conditions of an order or failure to pay a fine or penalty) and can be directed at a variety of source control or remedial activities. One form of court action is the natural resources damage claim (discussed below), which enables a state or federal resource management agency to sue responsible parties for injuries to natural resources.

2.2 CONTAMINATED FACILITIES

Activities at contaminated facilities in Commencement Bay, including offsite disposal of treated waste (i.e., solid waste), are driven primarily by federal and state hazardous waste cleanup programs, state dangerous waste requirements, RCRA, and the TPCHD program for solid waste disposal sites.

2.2.1 Federal and State Hazardous Waste Cleanup Programs

Cleanup activities at contaminated sites are conducted primarily by EPA and Ecology under programs associated with CERCLA and the Washington State hazardous waste, management, and cleanup acts. Major investigation, assessment, and remediation activities conducted by programs under these laws include:

- Preliminary Assessment or Site Investigation—a preliminary study performed at a contaminated site. Such studies predominately involve the collection of existing data about contamination (if any) and activities at the site. In some cases, limited screening level or reconnaissance surveys are conducted.
- Remedial Investigation (RI)—a study emphasizing data collection and site characterization to support the evaluation and design of remedial alternatives. RI activities include the collection and evaluation of existing data, the collection of new data to characterize the site, and the identification of general response actions.

- Feasibility Study--a study performed to identify, evaluate, and recommend remedial action alternatives. Activities undertaken during an FS include the development of specific alternatives based on general remedial action categories identified in the RI, the screening of technologies to evaluate their applicability to the site, combining appropriate technologies to form alternatives, and evaluating alternatives based on effectiveness, implementability, and cost.
- Engineering Evaluation/Cost Analysis—a comparative technical and cost analysis that focuses on removal action options for a hazardous waste site. Removal actions can include treatment, recycling, or disposal. An engineering evaluation generally contains information such as site characterization, identification of removal action objectives and alternatives, screening and analysis of removal alternatives, and development of a recommended removal action.
- Natural Resource Damage Assessment (NRDA)—a study performed to estimate the monetary damages associated with the environmental impacts of hazardous materials. Major activities in an NRDA include the determination and quantification of injuries (in terms of biomass of organisms or units of habitat), determination of the monetary damages associated with resource injuries, and development of a plan for restoring the injured natural resources. A number of trustee agencies can be involved in NRDA, including Ecology, WDNR, WDF, WDW, NOAA, FWS, and Indian tribes.
- Site Remediation--remedial activities selected during an FS are documented in a ROD, which then serves as the basis for enforcing site remediation. Orders and decrees can be issued to ensure that actions specified in a ROD are carried out fully and on schedule.

2.2.2 State Dangerous Waste Regulations

State dangerous waste regulations (173-303 WAC) implement the HWMA and implement in part state hazardous waste regulations (70.105A RCW) and RCRA. One of the most significant aspects of the dangerous waste regulations is the procedure and criteria for identifying dangerous waste (DW) and extremely hazardous waste (EHW). Other important features of the regulations are the provisions for:

- Surveillance and monitoring of DW and EHW through detoxification, neutralization, reclamation, or disposal
- Establishing a system for manifesting, tracking, reporting, monitoring, recordkeeping, sampling, and labeling DW and EHW
- Establishing requirements for siting, design, operation, closure, post-closure, financial records, and monitoring at transfer, treatment, storage, and disposal (TSD) facilities
- Establishing requirements for managing the state EHW disposal facility

- Types of facilities covered
- Persons covered
- Actions covered
- Areas covered.

A requirement may be relevant and appropriate even if it is not applicable. In general, a requirement can be considered relevant and appropriate if the situation at the CERCLA site is sufficiently similar to a problem that the requirement is designed to address.

In addition to ARARs, the CERCLA compliance policy specifies that other nonpromulgated or interim standards, advisories, and guidance that may be useful in developing remedial action alternatives are to be considered (TBC). TBC factors for the Commencement Bay nearshore/tideflats remedial effort may include federal and state policies, guidelines, and advisories; local ordinances such as City of Tacoma shoreline and land use plans; PSDDA guidelines for the handling and disposal of dredged material; and carcinogenic potency factors and reference doses established by EPA for use in developing criteria such as maximum contaminant levels (MCLs). TBCs can also be classified as chemical-specific, action-specific, or location-specific.

Federal, state, and local permits are not required for the portion of any removal or remedial action conducted entirely onsite, or for work performed under CERCLA Sections 104 and 106. However, substantive (but not procedural or administrative) requirements of permit applications may be legally applicable or relevant and appropriate for onsite actions. Offsite actions do not require an analysis of ARAR compliance. However, the transfer of hazardous or contaminated material offsite is allowed only if there is a facility operating in compliance with RCRA, Toxic Substances Control Act (TSCA), or other applicable state and federal requirements. The purpose of this offsite policy (U.S. EPA 1988) is to ensure that disposal facilities are technically sound so that CERCLA wastes do not contribute to present or future environmental problems.

Permits are expected to be required for all actions related to the control of existing permitted dischargers, but not for remedial activities occurring specifically under CERCLA (e.g., activities involved with sediment remediation). The overall regulatory objective of the IAP is to apply all relevant regulatory requirements to source-related remedial activities, and to invoke CERCLA procedures (e.g., potential permit waivers) only for sediment remedial activities.

A list of major programs and regulations affecting remedial activities in Commencement Bay is presented in Table 1. General relationships between remedial activities at the Commencement Bay site and major federal, state, and local regulatory programs are illustrated in Figure 4:

2.1.2 Enforcement Mechanisms for Implementing Laws and Regulations

Ecology and EPA have several enforcement tools available for initiating a variety of remediation activities at hazardous waste sites and enforcing source control actions. At hazardous waste sites, these tools are used primarily under the regulatory authority of CERCLA, RCRA, HWMA, the Washington HWCA (state Superfund law effective until 1 March 1989), and MTCA (effective 1 March 1989). They include consent and administrative orders and decrees, notices of violation, notice letters and demand letters, penalties, and court action.

Consent Decree/Consent Order--A consent decree is a binding agreement between a regulatory agency (e.g., Ecology or EPA) and a person or persons under enforcement. Consent decrees are used as aids to enforcement of long-term schedules or projects such as investigations or remediation at a contaminated site. Consent decrees are used when the regulatory agency has a willing responsible party as a partner in negotiations. Once agreement is reached on a consent decree and scope of work, these documents are filed with a state or federal court.

A consent order is essentially the same as a consent decree, but it is not filed with the Superior Court. Consent orders and consent decrees can be used as enforcement tools for both source control and remedial activities at contaminated sites. The state HWCA and MTCA specify that all agreements be filed with state Superior Court as consent decrees.

Notice of Violation—A notice of violation can be issued by a regulatory agency to provide formal notice that a specific violation has occurred or is about to occur. A notice of violation requires information from the violator within 30 days (20 days for a Clean Air Act violation) on the circumstances of the violation and actions being taken to correct or prevent it (Washington Department of Ecology 1985). Notices of violation can be issued for noncompliance relative to source control activities (e.g., violation of a discharge permit) or remediation at contaminated sites.

Administrative Order/Penalty--An administrative order is issued by a regulatory agency to direct a violator to take a specified course of action within a specified schedule (Washington Department of Ecology 1985). An administrative order may be used in cases where consent orders or decrees have not been effective. An administrative order cites the circumstances of the violation, the statute or rule violated, and the course of action and schedule for achieving compliance. An administrative order may be accompanied by a penalty. Penalties are used to encourage compliance, deter future noncompliance, or reduce the inherent inequity between those who comply voluntarily and those who comply only after regulatory action (Washington Department of Ecology 1985). Administrative orders and penalties can be issued for both source control activities and remedial activities at contaminated sites where there are violations.

2. OVERVIEW OF REGULATORY PROGRAMS AND RELATED ACTIVITIES

A variety of laws and regulations implemented by several levels of government affect environmental quality in Commencement Bay. The purpose of this section is to identify regulatory and management programs and requirements that are associated with the four categories of pollution problems summarized in Section 1.

The principal agencies involved in regulatory and management programs are Ecology, EPA, U.S. Army Corps of Engineers (COE), National Oceanic and Atmospheric Administration (NOAA), U.S. Fish and Wildlife Service (FWS), PSWQA, WDF, WDW, and WDNR. In addition to these agencies, the City of Tacoma, Pierce County, the Tacoma-Pierce County Health Department (TPCHD), and the Puyallup Tribe play important roles in managing environmental issues. The purpose of this chapter is to describe the regulatory and management programs of these groups in terms of their relationships to remedial activities at the Commencement Bay site.

This section is organized into seven subsections. Section 2.1 presents background information on the relationship between CERCLA and other environmental regulations, and enforcement mechanisms of Ecology and EPA. Sections 2.2-2.5 focus on regulatory activities and programs for contaminated sites, programs for controlling wastewater discharges, air discharge permit programs, and programs for the control of contaminant inputs from storm drains. Section 2.6 presents a discussion of programs and activities related to sediment remedial action and dredging. Section 2.7 discusses other programs and activities that indirectly affect source control and sediment remediation. Section 2.8 summarizes the nature and timing of the PSWQA Plan (PSWQA 1988) program elements that will influence source control and sediment remedial activities over the next several years.

2.1 REGULATORY SETTING FOR SOURCE CONTROL AND SEDIMENT REMEDIATION

Remedial activities proposed in the CBFS are subject to a number of environmental laws and regulations. This section presents background information on 1) the relationship between CERCLA and other environmental laws and regulations, and 2) enforcement tools available to federal, state, and local agencies, with particular emphasis on Ecology and EPA.

2.1.1 Relationship Between CERCLA and Other Environmental Laws and Regulations

Section 121(d)(2)(a) of CERCLA as amended by the Superfund Amendments and Reauthorization Act (SARA) incorporates the CERCLA compliance policy. According to this policy, remedial actions must meet promulgated requirements, criteria, or limitations that are legally applicable or relevant and appropriate. The policy further states that other standards,

criteria, advisories, and guidance that may be useful in developing remedies are to be considered, but not according to the formal evaluation process required for applicable or relevant and appropriate requirements (ARARs). ARARs of federal and state government and Indian tribes must be considered during CERCLA remedial action. Although local ordinances are not specified as ARARs, they are considered in the selection of alternatives.

J.W. Porter (9 July 1987, personal communication) differentiates between requirements that are legally applicable and requirements that are relevant and appropriate:

- Legally applicable requirements consist of substantive environmental protection requirements (e.g., standards for cleanup or control) promulgated under federal, state, or tribal law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site (e.g., drinking water standards, air emissions criteria, or state hazardous waste regulations that would be applicable at the site even if it were not being addressed under CERCLA).
- Relevant and appropriate requirements consist of substantive requirements promulgated under federal, state, or tribal law that, while not applicable, are sufficiently similar to applicable requirements that their use is well suited to a particular site (e.g., design requirements for RCRA landfills may be considered relevant and appropriate for a disposal operation at the site even though it is under CERCLA, not RCRA, jurisdiction).

For remedial actions within the CERCLA site boundary, ARARs must be met unless the requirements are waived pursuant to Sections 124(d)(4)(a-f) of CERCLA for one of the following reasons:

- The remedial action is an interim measure, and the final action will attain compliance with ARARs
- Compliance with ARARs will result in greater risk to human health or the environment than other alternative actions
- Compliance with ARARs is technically impractical
- The action will attain the equivalent of an ARAR through an analogous process
- For state requirements, the state has not consistently applied the ARAR in similar circumstances
- For CERCLA Section 104 actions, compliance with ARARs will jeopardize the availability of fund money for other sites (i.e., fund balancing).

If components of a candidate remedial alternative fall under the jurisdiction of a given ARAR, that ARAR is deemed applicable. Jurisdictional requirements include the following:

- Substances covered
- Time period covered

of Tacoma, TPCHD), complaints, referrals, or other means. List 1 includes virtually all vacant and developed property in close proximity to the problem area.

2.3.4.2 List 2—All Sites That Are Probable Sources of Problem Chemicals to a Problem Area

Following compilation of List 1, information on each potential source is reviewed by Ecology UBAT site inspectors and managers. The UBAT reviews all relevant information for each site (e.g., Ecology site files, responses to EPA Superfund information request letters, CB/NT documents). The UBAT may also conduct interviews with state, city, or county personnel and/or conduct onsite inspections or sampling to determine whether a site is a potential source. Numerous sites have been co-inspected by Ecology inspectors and the City of Tacoma's Sewer Utility Pretreatment personnel or TPCHD personnel, who add local perspective and often have personal knowledge of a facility's operations and history.

All sites that do not appear to be ongoing sources of problem chemicals to problem areas are deleted from List 1, and the remaining sites are referred to as List 2. Types of sites that may be deleted from List 1 include:

- Sites that do not handle problem chemicals
- Sites that handle problem chemicals, but for which there is no evidence that a release has ever occurred or is likely to occur (in general, welldocumented environmental audits must be completed for such properties)
- Sites that once had a release of problem chemicals which has been fully cleaned up
- Sites for which there is no pathway to the problem area.

Following this process, only sites that are probable or confirmed ongoing sources of problem chemicals to problem areas will appear on List 2. The purpose of List 2 is to summarize those sites that warrant additional evaluation and screening by Ecology, in anticipation of summarizing confirmed ongoing sources in List 3.

List 2 will be sent to the following source control agencies for their review: Ecology Southwest Regional Office Water Quality and Solid and Hazardous Waste Programs, TPCHD Commencement Bay Water Quality Program, and City of Tacoma Sewer Utility Division. Site summary information for each source on List 2 will be recorded by Ecology, and the criteria used to determine that a site is not a probable source will be recorded.

NOTE TO THE READER: If an ongoing source is identified, but it is not a source of problem chemicals to a CB/NT problem area, the site or facility is referred to an appropriate agency or program for action. Sites

may be referred to the City of Tacoma Sewer Utility Division; to TPCHD; or to Ecology's Water Quality Program, Solid and Hazardous Waste Program, or Leaking Underground Storage Tank Unit. The Commencement Bay UBAT maintains a permanent record in the site files of all referrals.

2.3.4.3 List 3—Confirmed Sources of Problem Chemicals to a Problem Area

Following completion of List 2, sites on List 2 are subject to a more rigorous assessment to determine whether they are confirmed sources of problem chemicals. To be classified as a confirmed ongoing source, the following information on a facility is considered:

- Documentation that one or more problem chemicals have been used, handled, disposed of, or stored onsite
- Evidence of a release of problem chemicals to the environment (e.g., soil, sediment, groundwater, surface water, air)
- Documentation of one or more pathways by which chemicals associated with the release could have reached a problem area
- Continued existence of the source reservoir (e.g., product, waste stream, or area of contamination), mechanism of release, and pathway to the problem area.

For some sites, Ecology may conduct additional site inspections or environmental sampling to verify the release of problem chemicals. Ecology may be required to await results of extensive environmental sampling efforts (e.g., groundwater modeling efforts) before determining whether a site is a confirmed ongoing source. Sites that are confirmed sources will appear on List 3, and the criteria used to determine that a site is not a confirmed source will be recorded in the site file or Ecology's specific waterway file.

2.4 SOURCE CONTROL

Once ongoing sources have been identified, source control is implemented to eliminate or reduce, to the extent practicable, the release of problem chemicals to a problem area. Source control activities in Commencement Bay are broad-ranging in scope and status of action. As defined in the ROD, source control includes the application of regulatory mechanisms and remedial technologies to be implemented according to applicable or relevant and appropriate requirements (ARARs), including the application of all known, available, and reasonable methods of treatment (AKART) for NPDES-permitted discharges, as necessary to achieve and maintain sediment cleanup objectives. The various methods that are effective in controlling sources are described in Appendix D of

this report. Source control methods include the following:

- Elimination of the source (e.g., repairing a leaking tank, replacing toxic constituents of industrial manufacturing processes with less- or nontoxic alternatives, routing a wastewater stream to the sanitary sewer system)
- Reuse or recycling of hazardous substances
- Destruction or detoxification of hazardous substances
- Implementation of best management practices (BMPs) (e.g., removing contaminated sediments from a storm drain, reducing chemical sources, routinely checking lines for leaks)
- Treatment (e.g., pumping and treating groundwater or effluent, installing additional waste treatment systems prior to discharge)
- Isolation or containment (e.g., capping of soil, installing berms around tanks that could leak or overflow) with attendant engineering controls.

Source control is implemented by Ecology, as well as other local agencies, using combinations of site inspections, promotion of voluntary actions, technical assistance, onsite cleanup actions, and legal actions.

Ecology's legal actions are conducted under enforcement authorities granted in the Hazardous Waste Cleanup Act (Chapter 70.105D RCW), Model Toxics Control Act (Chapter 173-340 WAC), Water Pollution Control Act (Chapter 90.48 RCW), and the Dangerous Waste Regulations (Chapter 173-303 WAC). Legal enforcement may include issuance of notices of violation, penalties, NPDES permits, criminal prosecution, negotiated consent decrees, and administrative unilateral or agreed orders to ensure compliance with environmental regulations. The enforcement policy for the CB/NT site, which is described in the EPA/Ecology Cooperative Agreement (see p. 7 of Appendix C of this report), essentially requires that legal actions for source control closely parallel the Comprehensive Environmental Response, Compensation and Liability Act process. The legal and administrative mechanisms of regulatory authorities for source control activities at the site are summarized in Table 2 of the ROD and Section 2 of the Integrated Action Plan, which are reproduced in Appendix A of this report.

2.4.1 Source Prioritization

Ecology cannot implement source control actions at all sites simultaneously. Ecology must prioritize sites to ensure that source control is focused on those sites that warrant more immediate attention.

Sites determined to have known or potential emergency situations will be subject to the

most expedient enforcement tools available (e.g., emergency response and removal, technical assistance, or issuance of unilateral order). Once the emergency action is complete, cleanup at the site will occur under an administrative order or consent decree, as warranted.

Sites that are not determined to have emergency situations will be remediated using the most appropriate enforcement tool, as determined by Ecology. Source control for major sources typically involves some type of administrative action (e.g., order, decree, permit) followed by actual physical control (e.g., reuse or recycling of material, destruction or detoxification, immobilization of hazardous substances, groundwater containment, implementation of BMPs, installation of treatment device).

For some ongoing sources, source control may be implemented through voluntary or independent cleanup actions conducted by private parties. Voluntary compliance, rather than legal enforcement, may be encouraged at low-priority sites to ensure that site managers are available for high and medium priority sites. Under the state's Model Toxics Control Act Cleanup Regulation (Chapter 173-340 WAC), cleanup actions that are protective of human health and the environment may be conducted "independently," without oversight from the state. However, because these independent actions are conducted at the potentially liable person (PLP)'s own risk, Ecology may take or require additional remedial actions at these sites at any time. Because of the legal restrictions on the participation of Ecology personnel with independent actions, Ecology cannot provide any oversight or any degree of assurance that the independent action will be sufficient to preclude future regulatory actions.

Finally, Ecology may work with other programs (e.g., Ecology Water Quality Program) or agencies (e.g., City of Tacoma Sewer Utility) to discuss mutual concerns about a facility and work out potential solutions to provide source control for problem waste streams.

As part of source control efforts, source monitoring will be required by Ecology to evaluate the effectiveness of source control measures. Ecology may require confirmatory sampling data (e.g., soil data that are collected after a removal effort), discharge monitoring data (e.g., treated effluent or storm water data), groundwater monitoring data to confirm whether a source has been eliminated, and sediment monitoring data. This information will also be used by EPA, as described in Section 3.3. Furthermore, Ecology' Sediment Management Unit (contact person - Brett Betts) is currently completing a Source Control Users Manual which will be used to evaluate source control efforts, primarily as they relate to facilities with NPDES permits. The document is considered a supplement to Ecology's Sediment Users Manual and is scheduled to be completed in June 1992.

2.5 REPORTING REQUIREMENTS

As lead agency for source control, Ecology will track the progress of source control activities in each problem area at the site. This information will be provided to EPA. Requirements for reporting to EPA the status of source control at the site are outlined in the EPA/Ecology Cooperative Agreement. The 1992 Cooperative Agreement, which is attached as Appendix C, includes the following requirements:

- 1. Ecology submits all administrative documents relating to existing or potential source control actions for EPA review. The types of documents submitted to EPA are summarized in Table 13. EPA reviews drafts of these documents and provides comments to Ecology, as appropriate. Although EPA will not maintain file copies of all Ecology documents, EPA is currently working on a database to track source control administrative actions completed at the site.
- 2. On a quarterly basis, UBAT submits to EPA a report that describes the specific source control actions and progress that has occurred in each problem area during the previous quarter.
- 3. Each year, UBAT submits to EPA a Source Control Annual Report to summarize planned source control activities at the site and to recommend any necessary adjustments to the implementation schedules for source control as currently defined in the ROD, or modified under previous Annual Reports. The draft 1993 Source Control Annual Report for the federal fiscal year (September 1992-August 1993) was submitted to EPA in January 1992. That draft work plan was revised and updated, and the final Source Control Annual Report will be agreed upon in June 1992.
- 4. As activities are completed, and in accordance with the EPA/Ecology Cooperative Agreement, UBAT submits Source Control Letter Reports and Source Control Completion Reports for each problem area. These reports are more fully described in Section 3.

TABLE 13. ECOLOGY ADMINISTRATIVE DOCUMENTS SUBMITTED TO U.S. ENVIRONMENTAL PROTECTION AGENCY

Final National Pollutant Discharge Elimination System (NPDES) permits, fact sheets, responsiveness summaries, companion orders to permits, enhanced Class II inspection reports, and NPDES permit appeal settlements.

Final administrative orders/decrees and amendments to those orders/decrees of penalties and penalty settlements.

Field compliance letters.

Relevant reports prepared by Ecology's Environmental Investigation and Laboratory Services program.

Summary information on voluntary cleanups.

Completed criminal investigations.

3. SOURCE CONTROL ACTIONS AND SEDIMENT CLEANUP ACTIONS

This section describes the approach developed by EPA and Ecology to link source control actions with sediment cleanup actions in each problem area. The approach, which builds on concepts presented in the ROD, relies on administratively defined milestones for source control. These milestones can be easily determined and reported by Ecology and provide useful information to EPA regarding starting points for sediment remedial design and remedial action.

Section 3.1 describes the five milestones for source control. Section 3.2 describes the sediment cleanup activities. Section 3.3 more fully describes the links between source control actions and sediment cleanup actions.

3.1 SOURCE CONTROL MILESTONES

The following five milestones have been developed for tracking and reporting source control efforts for each problem area:

- Milestone 1—Ongoing Confirmed Sources Identified: Milestone 1 is achieved when all confirmed ongoing sources of problem chemicals are identified, and Lists 1, 2, and 3 have been completed for a problem area.
- Milestone 2—Essential Administrative Actions in Place for Major Sources: Milestone 2 is achieved when essential administrative actions (e.g., permits, orders, decrees) are in place for major sources of problem chemicals in each problem area.
- Milestone 3—Essential Remedial Action Implemented for Major Sources: Milestone 3 is achieved when essential remedial actions (e.g., construction, BMPs, soil removal) have been implemented for all major sources in a problem area. Essential remedial actions are those physical changes that represent elimination and/or reduction, to the extent practicable, of those contaminant sources that are most directly linked to existing sediment impacts.
- Milestone 4—Administrative Actions in Place for All Sources: Milestone 4 is achieved when administrative actions are in place for all confirmed ongoing sources of problem chemicals to a problem area.

Milestone 5—Remedial Action Implemented for All Sources: Milestone 5 is achieved when remedial actions have been implemented for all ongoing sources of problem chemicals to a problem area.

These milestones have been incorporated into Ecology's source tracking strategy. Ecology will notify EPA when each milestone for source control is achieved. At each milestone, EPA may choose to initiate an appropriate action related to sediment remediation (see Sections 3.2 and 3.3).

3.2 SEDIMENT REMEDIAL DESIGN AND SEDIMENT REMEDIAL ACTION

This section describes sediment remedial design (e.g., sediment studies to identify the type of sediment action to occur) and sediment remedial action (e.g., active dredging, capping) to be conducted at the site.

3.2.1 Sediment Remedial Design

For each problem area, the sediment remedial design phase will begin with the collection of supplemental sediment data. Sediment remedial design data will be used to characterize the sediments, to identify areas that may recover through natural processes, to assess the effectiveness of source control, and to determine the volume of sediments that require active remediation (see Section 10.2.5 of the ROD).

If remedial action is determined to be necessary, data will be used to evaluate alternative approaches for sediment cleanup. Each alternative will be evaluated for consistency with the ROD cleanup options and for compliance with environmental requirements under federal, state, and tribal law. Studies will provide information on the behavior of dredged material relevant to the selection of dredging equipment (e.g., results of column settling tests); information on the behavior of specific chemical constituents in the sediments relevant to the design of a confinement structure, if appropriate (e.g., results of elutriate and column leaching tests); and information to provide a baseline for post-remedial action monitoring.

To evaluate the potential for sediment recontamination after active remediation, sediment remedial design data will be used to support an assessment of the current status of source control prior to remedial action implementation (e.g., by sampling surface sediments in the vicinity of known contaminant sources that have been subject to source control efforts).

Information gathered as part of sediment remedial design will also be used to assess existing habitats and potentially impacted habitats, used by the Natural Resource Trustees

in the natural resource damage assessment, and permit assessment of habitat losses associated with sediment remediation and the consequent need for habitat mitigation.

During the sediment remedial design phase, EPA will require that, at a minimum, surface sediment samples be analyzed for those constituents shown in Table 11, and certain surface sediment samples will be analyzed for constituents shown in Table 12. For those compounds that do not have sediment cleanup objectives defined in the ROD, EPA may develop new sediment quality values to ensure the protection of the marine environment, as appropriate. Finally, EPA may determine, and PRPs may propose, that certain biological tests are necessary as part of sediment remedial design activities.

Although sediment remedial activities took place in 1988 at the St. Paul Waterway, the Sitcum Waterway Problem Area is the first CB/NT problem area to be addressed exclusively through the Superfund remedial design/remedial action process since the 1989 ROD. Sediment remedial design activities are currently underway, and Phase 1 activities are anticipated to be completed in 1992. Although it is not required by law, EPA has determined that documents related to the evaluation of remedial design alternatives will be made available for public comment. After considering the comments received, EPA will select the cleanup approach for the waterway. Activities in this waterway may serve as a model, revised as appropriate, for other problem areas.

3.2.2 Sediment Remedial Action

Following the sediment remedial design phase, source control and monitoring will continue in a problem area until Ecology and EPA determine that all major sources have been controlled to the extent, or to the extent practicable, that sediments in a problem area are unlikely to become recontaminated after sediment remedial action. Once sources have been adequately controlled, sediment remedial actions will then be implemented.

Sediment remediation involves a combination of passive remediation (i.e., natural recovery mechanisms) and active remediation (e.g., capping in place, or removal by dredging and relocation in a confined disposal facility). In any problem area, the decision to initiate sediment remediation will require evaluation of the success of source control from empirical data, such as source loading data, sediment monitoring data, and sediment trap data; completed reports, such as Ecology's Source Control Letter Reports to EPA; sediment remedial design data; and other available information (e.g., inspections that confirm implementation of BMPs).

3.2.3 Sediment Monitoring

Following remediation, long-term monitoring of the remediated problem area, the sediment disposal site, and habitat mitigation/restoration areas will be required. As part of the sediment cleanup action, EPA will develop and implement monitoring programs

for areas that are predicted to recover naturally, areas that have undergone sediment remediation, areas for habitat mitigation and/or restoration, and disposal sites. Sediment monitoring will confirm that the selected remedy is effective by 1) tracking the progress of natural recovery, 2) managing permitted sediment impact zones, 3) confirming the effectiveness of sediment confinement options, and 4) ensuring that source controls remain effective.

3.3 LINKING SOURCE CONTROL ACTIONS TO SEDIMENT CLEANUP ACTIONS

This section describes the relationships between key elements of source control and sediment actions that are relevant to implementing the CB/NT cleanup plan. These relationships were set forth in the ROD and are summarized in Figure 2. The specific source control actions that are linked to sediment actions are also shown in Figure 2, and the key decision points for implementing sediment remedial design and sediment remedial action are identified. These issues are more fully described below.

3.3.1 Milestone 1—Ongoing Confirmed Sources Identified

Following investigation and evaluation of all potential sources of problem chemicals to a problem area, all confirmed ongoing sources are identified. When Milestone 1 is reached for a problem area, List 1 (all potential sources), List 2 (all probable sources), and List 3 (all confirmed sources) have been completed. Lists 1, 2, and 3 are described in Section 2 of this report.

Upon completion of Milestone 1, Ecology submits a Letter Report to EPA. This Letter Report identifies the name of each source (i.e., facility/site), the problem chemical(s) associated with each source, and the pathway(s) associated with that source. The Letter Report also identifies the "major sources" that were defined in the ROD, as well as any new major sources that are determined by Ecology to be "major" sources during their source identification process.

Milestone 1 concludes an important step in the overall CB/NT cleanup strategy. It provides Ecology with an understanding of the sources within each problem area and will therefore allow more accurate refinement of source control schedules in each problem area and for the entire site. Milestone 1 is shown in Figure 2.

3.3.2 Milestone 2—Essential Administrative Actions in Place for Major Sources

Milestone 2 is achieved when essential administrative actions (e.g., orders, decrees, permits) are in place for all major sources of problem chemicals in each problem area.

Administrative actions are defined in the Enforcement Policy of the EPA/Ecology Cooperative Agreement (see page 7 and Attachment A of the Cooperative Agreement, which is attached as Appendix C to this report). Administrative actions include orders, decrees, and permits. Essential administrative actions are those actions that must be in place to ensure that major sources of problem chemicals to a problem area will be controlled so that sediment recontamination would not be expected to occur after the action is completed (i.e., after the source is controlled). Major sources are defined in the ROD and the Integrated Action Plan, and new major sources may identified by Ecology in the Source Control Annual Report. The control of major sources is important to project success, because these sources are most directly linked with current sediment impacts in each CB/NT problem area.

Completion of Milestone 2 therefore indicates that permits and/or orders have been issued to all known major sources of problem chemicals in a problem area and contaminant sources are under administrative control. The orders and/or permits for major sources must include requirements and schedules for completing specific actions (e.g., work plans for RI/FS or Cleanup Action Plans). Specific source control actions do not have to be performed. For example, to meet Milestone 2, an order for a major source might have to include a schedule for defining the nature and extent of contamination in soils from the upland bank of a waterway, but a schedule for remedial action would not need to be defined. Furthermore, for Superfund purposes, the order for that major source would not have to include a schedule for non-essential source control actions. Information on "essential" source control actions will be determined by Ecology and may be supported by information presented in the CB/NT RI and FS reports. Ecology will make these determinations based on knowledge of all source control actions necessary at the sites and using best professional judgment to identify those essential source control actions that must be under administrative control so that sediments are not recontaminated.

Upon completion of Milestone 2, Ecology submits a Letter Report to EPA. The Letter Report summarizes information related to each major source, including name, location, problem chemical(s), pathway(s), type(s) of administrative action, required source control actions (specifying those actions that are considered "essential"), and the schedule and status of source control actions.

After Ecology completes Milestones 1 and 2, EPA may choose to initiate sediment remedial design activities, if such action is warranted. This is shown as the first key decision point in Figure 2 that links source control actions and sediment remedial actions.

3.3.3 Milestone 3—Essential Remedial Action Implemented for Major Sources

Milestone 3 is achieved when essential remedial actions have been implemented for all major sources in a problem area. Essential remedial actions are those physical changes (e.g., construction, BMPs, soil removal, storm drain cleaning) at major sources that

represent elimination and/or reduction, to the extent practicable, of those contaminant sources that are most directly linked to existing sediment impacts. These essential remedial actions generally occur under an order or permit. Ultimately, these actions eliminate or reduce to the extent practicable, all sources of problem chemicals that could potentially recontaminate sediments.

Final and complete remedial action on all "non-essential" aspects of each major source is not required for Milestone 3. Also, complete source control monitoring results are not required for this milestone. At the completion of Milestone 3, Ecology ensures that remaining source control actions are completed and continues to verify source control efforts through evaluation of monitoring data for each major source. If, at any time, new information (e.g., monitoring data) reveals that the source is not adequately controlled, Ecology continues to be the enforcement lead for "ratcheting" actions. If continued impact to the waterway is documented and appears to be due to unknown sources, Ecology conducts additional source discovery and implement suitable administrative actions as necessary to achieve sediment quality objectives.

Certain source control remedial action efforts may deviate from the process established under Milestone 3. For example, there may be facilities or storm drains which, after implementation of AKART, still contribute contaminants at levels such that CB/NT sediment cleanup objectives are not attained in the vicinity of the source. For facilities that have a NPDES permit and discharge via a diffuser, a waiver may be incorporated into applicable discharge permits to allow a sediment impact zone (see Chapter 173-204 WAC).

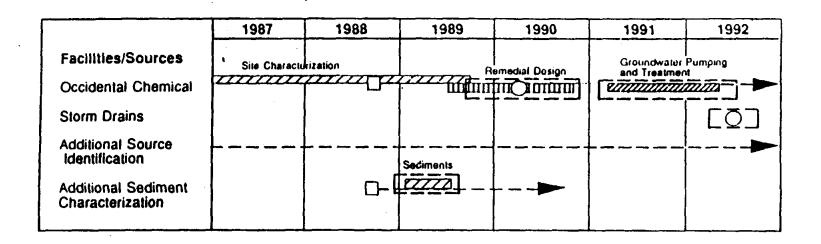
Upon completion of Milestone 3, Ecology submits a Letter Report to EPA. The Letter Report summarizes information related to each major source, including name, location, problem chemical(s), pathway(s), type(s) of administrative action for essential source control, required source control actions, and the schedule and status of source control actions. This report also describes the status of source control actions at all List 3 sites and includes source control efforts implemented within and outside of Ecology (e.g., Ecology Water Quality Program, EPA RCRA Branch).

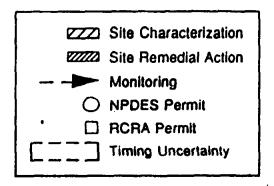
Milestone 3 concludes an important step in source control actions and marks an important starting point for sediment actions. Following completion of Milestones 1-3, EPA may, depending on the timing and evaluation of information developed during sediment remedial design activities, as well as other factors, initiate sediment remedial action (e.g., capping, dredging). This is shown as the second key decision point in Figure 2 that links source control actions and sediment remedial actions. The decision to initiate sediment remediation includes evaluation of:

- Ecology's Letter Reports for each problem area, which summarize major sources and describe the administrative actions that are in place to control those and other potential sources.
- Empirical data, such as sediment monitoring data, sediment trap data, and

Section 2, Integrated Action Plan (PTI 1988)







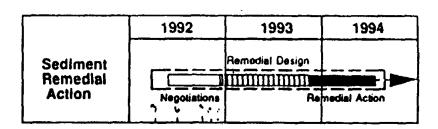
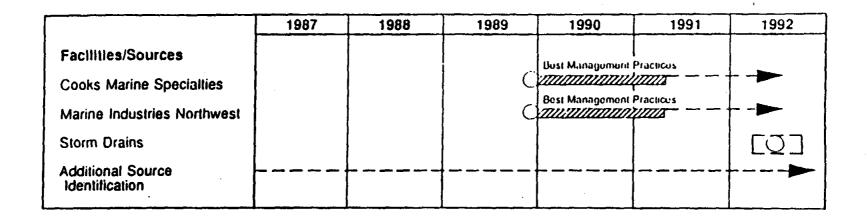
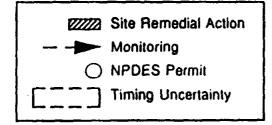


Figure C-3. Recent, ongoing, and planned activities at the Mouth of Hylebos Waterway

Figure C-1. Recent, ongoing, and planned activities at the Head of Hylebos Waterway





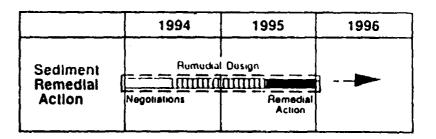
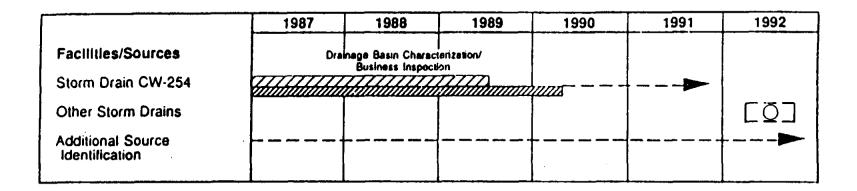
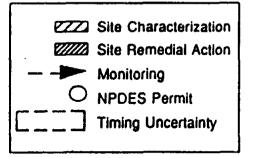


Figure C-9. Recent, ongoing, and planned activities in Middle Waterway





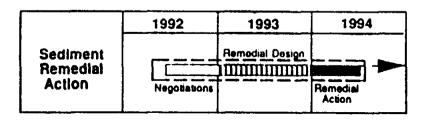
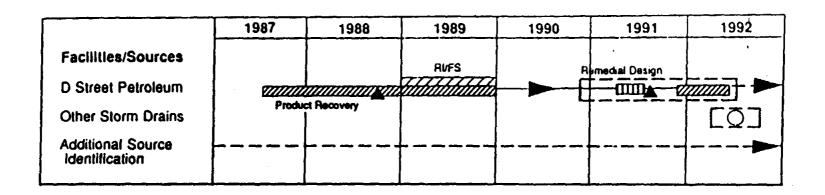
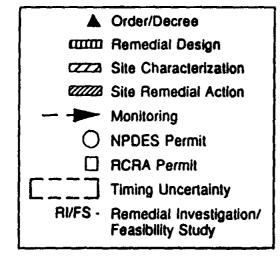


Figure C-12. Recent, ongoing, and planned activities in Wheeler-Osgood Waterway







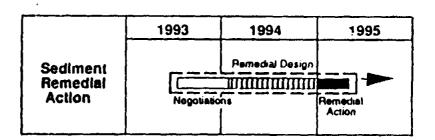
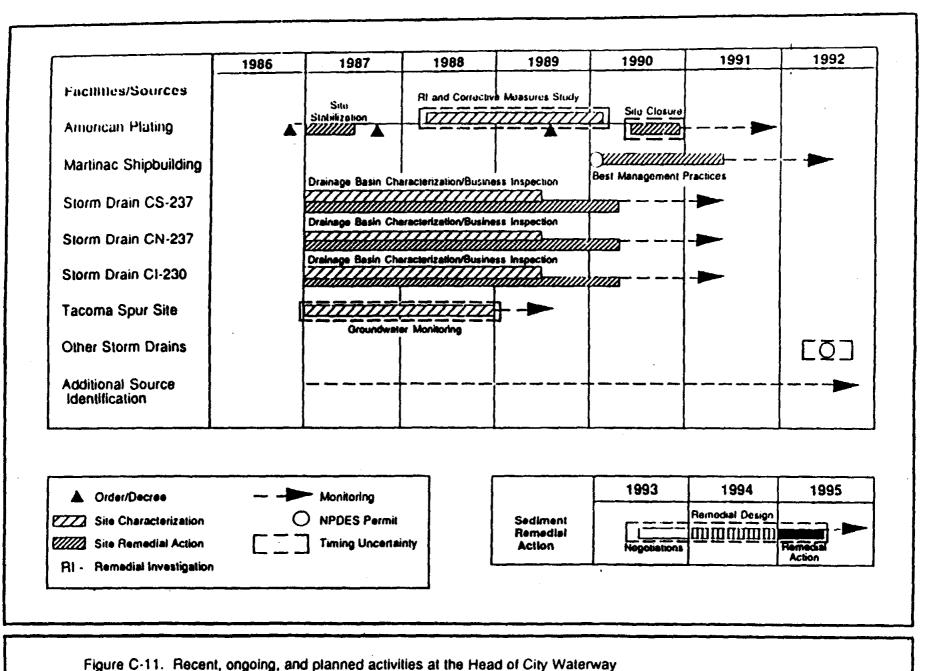


Figure C-13. Recent, ongoing, and planned activities at the Mouth of City Waterway



Source Control and Sediment Remediation Schedules

Appendix C of Record of Decision (U.S. EPA 1989)

APPENDIX A

CB/NT Schedules and Integrated Action Plan

4. REFERENCES

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monitoring results confirming the success of source control actions, and any uncertainties remaining. The completion report submitted by Ecology will be similar to that submitted to EPA by Ecology for the St. Paul Waterway (reproduced in Appendix E of this report). As with Milestone 3, completion of source control is based on the anticipated success of remedial action, rather than confirmatory evidence of that success through monitoring results for all sources. Also, long-term sediment monitoring data collected after sediment remedial design data may be used to assess the effectiveness of source control efforts.

3.4 UNCERTAINTIES

Several important issues should be kept in mind when considering the source control strategy presented in this report. The agencies have developed a systematic approach for achieving source control objectives defined in the CB/NT ROD. While the approach incorporates methods to identify and control potential sources and to evaluate the effectiveness of source control actions, the scope and complexity of the site require that best professional judgment be judiciously applied throughout the process. When verifying the completeness of source control in a problem area, the process has been designed to allow use of the simplest screening tools for most sources, only progressing to the more complex screening tools when the simpler tools are not adequate. It is essential that the flexibility to refine and adjust levels of source control (based on long-term monitoring results) be incorporated into all source control and sediment remedial actions within the site. Finally, throughout the source control process, new sources and problem chemicals may be identified at any time, which could affect the source control milestones and alter both the source control and sediment remediation schedules.

3.5 MONITORING OF SOURCE CONTROL ACTIONS

Throughout Milestones 1-5, Ecology's responsibilities continue in a "confirmatory monitoring" or "operation and maintenance" phase for those source control actions that have been implemented. To verify the success of specific source control actions, Ecology may evaluate information from various agency and non-agency investigations. Confirmatory sediment, soil, and water quality monitoring data from PLPs will be available for specific sources. Ecology will also evaluate the sediment trap data collected by Ecology's Environmental Investigation Laboratory Services and results of other relevant agency investigations.

To verify the success of specific source control actions, Ecology may also evaluate sediment monitoring data required of PRPs by EPA. Both chemical and biological sediment data will be collected during sediment remedial design in a problem area, as well as in post-remedial design in problem areas, mitigation sites, and sediment disposal areas. An assessment of those data may require that source control actions be modified, or that new source control actions be required. Finally, the effectiveness of source control will be evaluated 5 years after the remedy has been implemented in a problem

area; it is anticipated that at this time Ecology's Letter Reports will be reviewed and the uncertainties associated with source control activities will be evaluated.

- source loading data (e.g., effluent data) for a problem area.
- Sediment remedial design data collected under EPA order or decree to define the nature and extent of contamination in a problem area and evaluate the effectiveness of source control. These data include chemical and biological assessments and may include historical data reviews.

The decision to initiate sediment remediation may also include reviews of other pertinent information (e.g., inspections which confirm implementation of BMPs).

Several factors are considered in this evaluation, including the possibility of unidentified major sources within the problem area, the status of source control for known sources, and the possible cumulative effects from other CB/NT sources. Over the long term, Ecology proposes to monitor the success of individual site source control activities and to conduct empirical sediment trap monitoring in each problem area. However, Ecology, EPA, or other parties may choose to evaluate contaminant loading to the problem area on a problem area-wide basis. Ecology is a support agency for all technical decisions related to the sediment cleanup phase, but EPA is the final decision maker and enforcement agency for sediment remedial design and sediment remedial action.

Following implementation of sediment remedial activities, enforcement oversight by Ecology continues, particularly through monitoring the success of source control on a property-specific basis over the long term in each problem area. EPA requires similar sediment monitoring activities. Data sharing and continued coordination between EPA and Ecology during the post-cleanup monitoring phase is important to ensure the long-term success of the project.

In considering those source control remedial action efforts that have implemented AKART but may allow sediment impact zones, EPA may decide to go ahead with sediment remedial action and approve Ecology's authorization of a sediment impact zone for sources that are expected to exceed sediment cleanup goals for problem areas. This option is only compatible with state standards if the estimated concentrations within the area of impact are less than the maximum contaminant concentrations allowable in a sediment impact zone, as delineated in the Sediment Management Standards rule. Ecology will use sediment modeling efforts (e.g., WASP4) to define sediment impact zones. This option allows EPA maximum flexibility in timing sediment remediation and is consistent with the unique nature of this site, considering the commercial and economic importance of Commencement Bay as a center of trade for the region. As described in this report, EPA's goal is to remediate each problem area to address sediment impacts, and if a sediment impact zone is allowed under state NPDES regulations it is more easily monitored after sediment remediation of the entire problem area.

During negotiations with state PLPs for site cleanups, Ecology should inform PLPs that EPA may proceed with sediment remedial action in a problem area, even if PLPs do not adequately control sources in accordance with this source control strategy and proposed schedules. For example, sediment cleanup activities may proceed even if there are

delays in implementing source control efforts at a site or facility. In this situation, the PRPs are responsible for monitoring to assess for potential sediment recontamination after sediment remedial action is complete in a problem area. Ultimately, EPA's orders and consent decrees for sediment remedial action will require that PRPs remain liable for any recontamination of sediments. This approach should provide an incentive for PLPs to eliminate and/or reduce the release of contaminants to the waterways as soon as possible.

3.3.4 Milestone 4-Administrative Actions in Place for All Sources

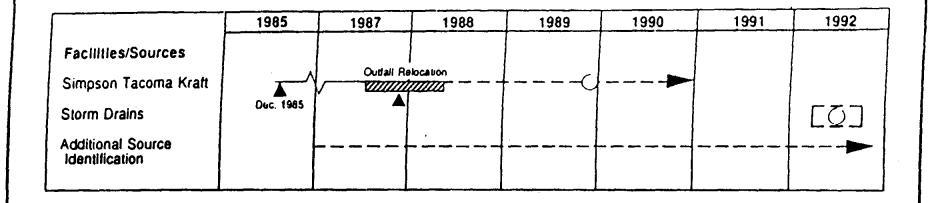
Milestone 4 is achieved when administrative actions (e.g., orders, permits) are in place for all confirmed ongoing sources in a problem area. In contrast to Milestone 2, which signifies the same step for major sources, Milestone 4 represents a progressive step toward completion of source control by Ecology. Administrative actions are defined in the Enforcement Policy of the EPA/Ecology Cooperative Agreement (see Appendix C). Confirmed ongoing sources are those sources that are identified on List 3 (see Section 2) and any new sources that were identified subsequent to Ecology's completion of List 3.

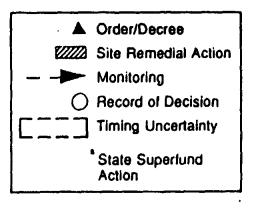
Milestone 4 represents a progressive step toward completion of source control efforts by Ecology in problem areas at the site. However, source control is an ongoing process and it is difficult to identify and track all sources through time. In particular, as facilities change processes or operations, potential new sources may develop. Thus, source control is never truly complete. Therefore, both Ecology and EPA will continue to enhance and clarify the relationship between Milestone 4 and the goals of the CB/NT cleanup plan, which may result in a modification to this milestone (e.g., long-term monitoring data collected after remedial action may be used to evaluate when source control is complete). Essentially, source control is an ongoing process that is never complete.

3.3.5 Milestone 5—Remedial Action Implemented for All Sources

Milestone 5 is achieved when remedial action (e.g., construction, removal) has been implemented for all sources in a problem area. Monitoring data to confirm effectiveness is not required for this milestone.

Upon completion of Milestones 1-5 in a problem area, Ecology submits a Superfund Completion Report for Source Control to EPA for review and approval. The Superfund Completion Report describes all source control actions that have been implemented in a specific problem area, including actions conducted within Ecology and external to Ecology. All sources, including major sources, are discussed. The report identifies all facilities/properties that required source control actions, the actions that were taken, any





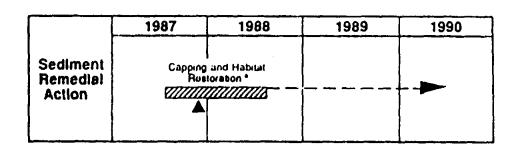
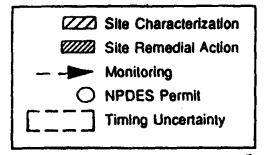


Figure C-7. Recent, ongoing, and planned activities in St. Paul Waterway



	1989	1990	1991	1992
Sediment Remedial Action	Noc	Romodial (Dosign 	

Figure C-5. Recent, ongoing, and planned activities in Sitcum Waterway

Pesticides/PCBs

98. a-BHC

99. B-BHC

100. *δ*-BHC

101., y-BHC (Lindane)

102. Heptachlor

103. Aldrin

104. Heptachlor epoxide

105. Endosulfan I

106. Dieldrin

107. 4.4'-DDE

108. Endrin

109. Endosulfan II

110. 4,4'-DDD

111. Endosulfan sulfate

112. 4,4'-DDT

113. Methoxychlor

114. Endrin ketone

115. Endrin aldehyde

116. a-Chlordane

117. y-Chlordane

118. Toxaphene

119. Aroclor - 1016

120. Aroclor - 1221

121. Aroclor - 1232

122. Aroclor@-1242

123. Aroclor@-1248

124. Aroclor®-1254

125. Aroclor*-1260

Inorganic Analyses*

- 1. Aluminum
- 2. Antimony
- 3. Arsenic
- 4. Barium
- 5. Beryllium
- 6. Cadmium
- 7. Calcium
- 8. Chromium
- 9. Cobalt
- 10. Copper
- 11. Iron
- 12. Lead
- 13. Magnesium
- 14. Manganese
- 15. Mercury
- 16. Nickel
- 17. Potassium
- 18. Selenium
- 19. Silver
- 20. Sodium
- 21. Thallium
- 22. Vanadium
- 23. Zinc
- 24. Cyanide

^a For organic analyses, the list of organic compounds is from the U.S. EPA Contract Laboratory Program Statement of Work for Organic Analyses, Multi-media, Multi-concentration. Document Number OLMO1.0 (associated IFB No. 0000463R1).

Previously known by the name bis[2-chloroisopropyl]ether.

^c For inorganic analyses, the list of elements is from the U.S. EPA Contract Laboratory Program Statement of Work for Inorganic Analysis, Multi-media, Multi-concentration. Document Number ILM01.0 (associated IFB No. D00042R1, D0004662R1).

EPA may assist Ecology in identifying potential historical sources of the "new" problem chemicals. It might be necessary only to review inspection files to evaluate potential sources, or it might be necessary for Ecology to conduct additional source investigations and/or source control. Based on those results, EPA may determine that there are new PRPs for the sediment remedial action phase of the cleanup. The identification of new sources and problem chemicals could alter both the source control and sediment remediation schedules.

2.3.4 Tracking and Screening Process for Source Identification

The tracking and screening process for source identification involves the preparation, in sequence, of three lists of sites for each problem area - List 1, List 2, and then List 3. The process is implemented in each problem area per the schedules defined in the ROD (reproduced in Appendix A of this report) and as modified and approved by EPA.

List 1 summarizes all sites that have been identified as known or potential sources to a problem area. List 1 sites are screened by Ecology to determine whether sites are probable sources. List 2 summarizes all sites that have been identified as probable sources to a problem area. List 2 sites are assessed by Ecology to determine whether sites are confirmed sources. List 3 summarizes all sites that are confirmed, ongoing sources to a problem area. List 3 sites are prioritized by Ecology to determine the order in which the sites will be addressed by UBAT.

NOTE TO THE READER: It should be emphasized that Lists 1-3 summarize potential and confirmed ongoing sources of problem chemicals. These lists of sources should not be confused with EPA's list of PRPs. EPA will determine PRPs based on information for both ongoing and historical sources that contribute(d) problem chemicals to a problem area and/or for parties that own(ed) property with contaminated sediments. Parties are notified of their status as a PRP when EPA issues General Notice Letters; PRP status is later confirmed by EPA's Special Notice Letters that begin negotiations for sediment remedial action.

More detailed information on Lists 1, 2, and 3 is provided below.

2.3.4.1 List 1—All Sites That Are Known or Potential Sources of Problem Chemicals to a Problem Area

List 1 includes sites that were identified as sources in the CB/NT RI and FS reports and integrated action plan; the February and April 1989 and September 1990 EPA PRP lists; the 1992 EPA/Ecology Cooperative Agreement (see Appendix C of this report); UBAT site inspections; and other sites that are referred to Ecology by local agencies (e.g., City

Under the national pretreatment program, EPA has set effluent standards for certain categories of industries. However, more stringent limits can be set based on the effects of the industrial discharge on the treatment process at the treatment plant (i.e., some pollutants can disrupt treatment processes and thus pose a threat to treatment plants) or the effects of contaminants on sludge (i.e., contaminants in sludge may adversely affect sludge disposal options). In addition, the CWA prohibits the discharge into sewer systems of pollutants that will "pass through" or "interfere" with the operation of the treatment plant. Limits based on these definitions are called prohibitive standards. Where there are no categorical standards, prohibitive standards serve as the basis for state discharge permit limits. The pretreatment limits may be complemented by limits set in the municipal NPDES permit. This regulatory hierarchy provides the plant operator with an incentive to police pollutants that may pass through the treatment plant.

Under authority from Ecology, the City of Tacoma Public Works Department manages an industrial pretreatment program. In addition to self-monitoring requirements imposed by the permits, the City of Tacoma monitors all industries twice yearly (18 permitted facilities, 13 permits in progress). Parameters measured include pH, oil and grease, total suspended solids, and metals. Tacoma's ordinances for pretreatment permits also specify maximum discharge limits for some metals. Remedial alternatives involving the discharge of effluent to Tacoma's sanitary sewers would need to comply with the substantive requirements of the program (e.g., discharge limitations and monitoring).

2.4 AIR EMISSIONS

Some existing sources of airborne contamination are regulated by Prevention of Significant Deterioration (PSD) permits issued by the Puget Sound Air Pollution Control Agency (PSAPCA) or Ecology, depending on the source type. Ecology's industrial section is responsible for permits for the aluminum, pulp and paper, and refinery industries. PSD permits are intended primarily for the control of "criteria pollutants" such as particulate material, NO_x, and SO₂. Air emissions are also regulated by PSAPCA through Notice of Construction permits, which are required by PSAPCA prior to construction of facilities or structures that may have air emissions. These permit applications are reviewed on a case-by-case basis, and PSAPCA may require no controls, monitoring, specific controls, or best available control technology (BACT), depending on the quantity and nature of emissions. Remedial alternatives involving the discharge of air emissions would be required to comply with the substantive requirements of a PSD permit for a facility onsite, and the substantive, procedural, and administrative requirements of a PSD permit for a treatment facility offsite.

2.5 STORM DRAINS

Nearly 400 storm drains serve the Commencement Bay study area. A small number of these storm drains were identified as major sources of sediment contaminants during the CBRI/CBFS. Programs to reduce contaminant inputs from storm drains are described below.

2.5.1 NPDES Permits and Stormwater Control Regulations

Both the Water Quality Act of 1987 (PL-100-4) and the PSWQA Plan establish phased and tiered approaches to controlling municipal and industrial stormwater discharges. Section 405 of the Water Quality Act of 1987 establishes schedules for promulgating regulations and issuing NPDES permits for:

- 1. Discharges that are currently permitted
- 2. Discharges associated with industrial activity
- 3. Discharges from separated municipal stormwater sewer systems serving a population of 100,000 or more
- 4. Any discharge which is a significant contributor of pollution.

With respect to industrial stormwater discharges, the law requires EPA to promulgate NPDES permit application requirements by February 1989. NPDES applications are due by February 1990. EPA or the state of Washington is required to issue permits by February 1991. These permits are to require compliance as soon as practicable, but in no case later than 3 years after the date of permit issuance. Industrial stormwater dischargers are required to apply BACT standards for reducing contamination in stormwater.

Under Section 402 of the Water Quality Act of 1987, Ecology must issue permits for certain categories of stormwater discharges according to the following schedule:

- By February 1991, permits are to be issued or denied for 1) discharges associated with industrial activity, and 2) discharges from separated municipal stormwater sewer systems serving a population of 250,000 or more
- By February 1993, permits are to be issued or denied for discharges from separated municipal storm sewer systems serving a population of 100,000 or more but less than 250,000.

Permits for municipal discharges may be issued on a system-wide or jurisdiction-wide basis and shall 1) effectively prohibit non-stormwater discharges into the system, and 2) require controls to reduce the discharge of pollutants to the maximum extent practicable.

Consistent with these requirements, the PSWQA Plan requires Ecology to develop and implement a stormwater control program and requires local government to develop and implement stormwater management programs. Ecology is required to produce manuals for use by local government on:

- Erosion control (by 31 December 1988)
- Detention/retention basins (by 30 June 1989)
- Land use/best management practice (BMP) guidance (by 31 December 1989).

Local governments, in turn, are required to begin developing stormwater programs by 31 December 1989 and demonstrate significant progress on the programs by 31 December 1991. By 2000, all cities and urbanized areas in the Puget Sound basin are required to implement stormwater programs.

2.5.2 Tacoma-Pierce County Health Department/City of Tacoma Storm Drain Program

Pursuant to a memorandum of agreement between Ecology, the City of Tacoma, and TPCHD, a program was initiated in August 1986 to identify and characterize contaminant sources to several publicly owned outfalls to Commencement Bay (Washington Department of Ecology 1986). Tasks undertaken by the program include drainage basin characterization (inspection and documentation of industries and comprehensive drainage basin mapping), quarterly wet weather and dry weather monitoring of storm drain effluent, periodic monitoring of key catch basin sediments, identification of sources (including roadway contaminant characterization), and development of effluent quality guidelines. The program focuses on a drainage system at the head of Sitcum Waterway, three drainages in City Waterway, and one drainage in Wheeler-Osgood Waterway. The program is scheduled for completion in December 1988. However, it is expected that storm drain monitoring and other activities (e.g., source identification) will continue over the long term (Lorbier, J., 18 February 1988, personal communication).

2.5.3 Tacoma Sewer Inspections

Sewer inspections are performed by the City of Tacoma Public Works Department as part of its sewer and storm drain construction and maintenance program. These inspections are directed at assessing the physical integrity and proper functioning of structures and to determine or verify sewer hookups and separation of sanitary from storm sewers. Activities performed by the Tacoma Public Works Department include routine dye and smoke testing, line inspections using video cameras, catchbasin cleanout, and line flushing. These activities are pertinent to Commencement Bay remedial actions to the extent that illegal hookups (to storm drains and sanitary sewers) or irregular connections between sanitary and storm sewers are discovered and corrected. In addition to maintenance-related inspections, the city also inspects businesses and industries with pretreatment permits (see Permits section below). Sewer inspections do not appear in the timelines presented in Section 5.

2.5.4 Tacoma-Pierce County Health Department Marine Resource Protection Program

The Marine Resource Protection (MRP) program was initiated by the Tacoma City Council in April 1985 to improve water quality in Commencement Bay. MRP activities include mapping of pollution sources and new outfalls, routine storm drain sampling, source control, interagency coordination, nonpoint pollution investigations, monitoring of Tacoma's industrial pretreatment program, and review of NPDES permits (Pierce et al. 1987). As of December 1987, MRP had mapped 383 storm drains in Tacoma's industrial tideflats. Under the program, each drain is sampled at least twice yearly. Most samples are analyzed for conventional parameters such as temperature, salinity, conductivity, pH, and dissolved oxygen. Selected samples are analyzed

for additional components (e.g., oil and grease, metals). When contamination problems are discovered, MRP personnel work with the owners or operators of the facility and staff of Ecology, the City of Tacoma, and TPCHD to implement BMP or other measures to minimize or eliminate contaminant inputs.

2.6 SEDIMENT REMEDIAL ACTION AND DREDGING

Contaminated sediments in the Commencement Bay area that are designated in the ROD for remediation may be handled as a result of navigational dredging and construction projects, as well as Superfund cleanup actions. A wide variety of regulatory programs and requirements pertain to these activities. For purposes of discussion, these programs are divided into those related to 1) in-water activities at the site, and 2) the treatment and offsite disposal of contaminated sediment.

2.6.1 In-Water Activities

In-water activities include dredging and capping of contaminated sediments. Dredging and dredged material disposal activities in Commencement Bay are regulated via Section 404 of the CWA, the state water quality certification process, WDF and WDW hydraulics permit, WDNR, Tacoma permits for dredged material disposal sites, and PSDDA procedures and guidelines for material and disposal site testing.

Clean Water Act Section 404 Permit--Section 404 of the federal CWA specifies requirements and guidelines for dredging and dredged material management, including designation of disposal sites. COE is responsible for processing and issuing permits under the Section 404 program. Federal guidance specifies procedures and criteria for achieving compliance with guidelines, evaluating and testing dredged material, developing and considering actions to minimize adverse effects, and issuing permits for the discharge of dredged material. Remedial actions that involve dredging will need to comply with the substantive requirements of the 404 process (e.g., contaminant concentration limits, see Appendix C of the CBFS for more detail).

State Water Quality Certification--Pursuant to Section 401 of the CWA, state water quality certification from Ecology is necessary for any project that may cause the violation of a state water quality standard. As part of the 404 permit process, a dredging (or dredged material disposal) remedial alternative will need to meet (at a minimum) the substantive requirements of state water quality certification (i.e., demonstrate that water quality standards will be met).

Washington Departments of Fisheries and Wildlife Hydraulics Permit-Hydraulics permit regulations require the issuance of a hydraulics permit by the WDF and WDW for any project that may interfere with the natural flow of water. Dredging or dredged material disposal remedial alternatives will need to satisfy the substantive requirements of the hydraulics permit

(i.e., agency review and approval of project specifications).

Washington Department of Natural Resources Aquatic Disposal Site Permit—WDNR issues permits for the disposal of dredged material only after project authorization has been obtained from EPA, COE, Ecology, and other agencies, and only at designated open-water disposal sites. Application for use of a site must meet with the approval of federal and state agencies (i.e., see CWA Section 404 permit above). WAC 332-30-166 establishes a procedure for site selection and a fee structure for site use. General requirements specified in WAC 332-30-166, which are mirrored in PSDDA guidelines (see section below), will have to be met by any sediment remedial action that involves open-water disposal. Approved disposal sites are being determined as part of the PSDDA process. Any additional sites proposed for use during sediment remediation would require independent review pursuant to WAC 332-30-166.

Tacoma Substantial Development Permit—The City of Tacoma has prepared a shoreline management plan (SMP) pursuant to the state Shoreline Management Act. The Tacoma SMP establishes environmental designations for shoreline segments within city limits and establishes allowable uses and restrictions, requirements, and limitations for those uses. SMP ordinances include provisions for application for a substantial development permit for projects within the shoreline area that are valued at more than \$2,500. Any projects involving capping or dredged material disposal and any dredging projects in Commencement Bay would have to comply with 2the substantive requirements of the Tacoma SMP.

PSDDA Procedures and Guidelines--The goal of PSDDA is to provide publicly acceptable guidelines governing environmentally safe unconfined, open-water disposal of dredged material (Phillips et al. 1988). The COE, EPA, WDNR, and Ecology began the PSDDA study in April 1985. The study is being conducted in two phases: 1) central Puget Sound and 2) north and south Puget Sound. A management plan has been proposed that addresses the uses of unconfined, open-water disposal, including disposal site locations, site management conditions, dredged material evaluation procedures, disposal site management, disposal site monitoring, and dredged material data management (Phillips et al. 1988). If the management plan is formally adopted by agencies managing dredged material, sediment remedial alternatives will be required to meet the plan's substantive requirements. In addition, some substantive requirements of the plan may be relevant and appropriate to sediment remedial actions other than open-water disposal (e.g., capping).

2.6.2 Treatment and Disposal of Contaminated Dredged Material

There are no federal, state, or local regulatory or management programs in place that are specifically aimed at regulating sediment treatment and disposal (state solid waste regulations have a section reserved for dredged material). However, a number of programs will affect activities that are components of sediment treatment and disposal alternatives (see Figure 4). Major activities include sediment solidification, solvent extraction, incineration, and disposal of treated material under a variety of conditions (e.g., open-water, nearshore, and upland). All

treatment alternatives will first be subject to the requirements of RCRA, state dangerous waste regulations, and state hazardous waste cleanup and management laws. In addition, sediment solidification, solvent extraction, and incineration will require compliance with the substantive and (depending on the location) procedural requirements of Tacoma Building Division permits to the extent that they involve citing of facilities (see Section 2.7.2). Solvent extraction and incineration will also likely be required to comply with the substantive and (depending on the location) procedural provisions of a PSAPCA PSD permit.

Alternatives involving the disposal of treated material will require compliance with a number of substantive and procedural provisions of one or more of the following (depending on disposal location): CWA Section 404 permit, state water quality certification, WDNR openwater disposal permit, WDF/WDW hydraulics permit, TPCHD solid waste requirements, RCRA, state dangerous waste regulations, and Tacoma Building Division permit (e.g., for shoreline substantial development).

Many treatment alternatives will involve dewatering and effluent discharge. These alternatives will be required to meet the substantive and (depending on the location) procedural requirements of an NPDES permit, state waste discharge permit, or Tacoma pretreatment permit.

2.7 OTHER ACTIVITIES AND PROGRAMS

Several activities and programs that are applicable to more than one type of source control, or are applicable to both source control and sediment remediation, include elements of the PSWQA contaminated sediment program, state sediment criteria development, Tacoma Building Division permits, and several public involvement programs.

2.7.1 State Sediment Criteria Development and Other Programs of the PSWQA Plan

The PSWQA Plan requires Ecology to develop and adopt by regulation criteria for identifying and designating sediments that have observable adverse effects on biological resources or pose a significant health risk to humans. The plan states that these criteria shall be used as a basis for limiting industrial and municipal discharges and to identify sites with sediment contamination. Ecology is currently in the process of developing five categories of standards and guidelines:

General Sediment Criteria
(Program Element P2)

Interim completed September 1988 Final by 30 June 1989

 Effluent Particulate Limits (Program Element P7) Depends on P2 criteria development

 Standards for Unconfined Disposal of Dredged Material (Program Element S2) Phase 1 is complete Phase 2 draft by late 1989 Standards for Confined Disposal of Dredged Materials (Program Element S4) Interim by September 1989 Final by July 1990

 Guidelines for Sediment Cleanup Decisions (Program Element S7) Final by January 1991.

Development of sediment standards is relying heavily on past and ongoing efforts of several agencies and involves active participation by Ecology, EPA, PSWQA, WDNR, COE, and a variety of public interest groups. The draft regulations currently under development affect only sediment in Puget Sound. The adopted regulation will be broadened to include the entire state at a future date.

Several other programs specified in the PSWQA Plan will affect contaminated sediment management, including elements of the combined sewer overflow and stormwater management program and the municipal and industrial discharges program. These programs are described in Section 2.8 below.

2.7.2 Tacoma Building Division Permits

The City of Tacoma Department of Public Works Building Division issues a variety of permits for the construction of commercial projects, including permits for building, drainage or grading, demolition, and shoreline substantial development. The permitting process requires the submittal of a variety of plans, including:

- Site Plans--Requiring information for all buildings on property delineation, street improvements, drainage control, and storm and sanitary sewer connections
- Structural Plans--Requiring information on design loads, foundation, soil and backfill, and masonry
- Mechanical Plans--Requiring information on heating and ventilation, plumbing, and ducting.

In addition, projects must satisfy requirements of the Tacoma Energy Code (for energy conservation), the State Environmental Policy Act (SEPA), and Tacoma's SMP. For most projects, SEPA will require completion of an environmental checklist to determine whether an environmental impact statement (EIS) will be required. The CERCLA process is considered to be the functional equivalent of an EIS, and it is unlikely that an EIS will be required for onsite remedial actions.

The Tacoma SMP requires a shoreline substantial development permit for projects within the shoreline (i.e., within 200 feet of ordinary high water) that are valued at more than \$2,500. Construction related to remedial action will most likely be required to conform to the requirements, limitations, and allowed uses in the shoreline area of Commencement Bay unless a variance to the requirements is granted.

Plans submitted to the City of Tacoma are reviewed at least by the city departments regulating sanitary/storm sewers, construction, traffic, planning, energy, fire, and plumbing/mechanical installations. Although permits from the Tacoma Department of Public Works are not required for onsite actions, projects may need to comply with the substantive requirements of plan development and review.

2.7.3 Public Involvement and Public Education Programs

Public involvement is an administrative requirement of programs under several environmental laws (e.g., CERCLA, NPDES, SEPA, building permits, dredging permits, and shoreline permits). The need to satisfy public involvement requirements will be determined on a case-by-case basis for planned remedial alternatives. For this reason, public involvement activities do not appear on the timelines depicted in Section 5. However, there are several ongoing public involvement programs related to remedial activities at the Commencement Bay site, and these are discussed below. In addition to these programs that are specific to the Commencement Bay Superfund site, the PSWQA Plan calls for establishing a public education and involvement program and providing technical assistance and funding for public education and public involvement projects.

Superfund Public Involvement Program-EPA, Ecology, and the TPCHD have developed a community relations program for activities at the Commencement Bay site as part of the overall Superfund public involvement program. A community relations plan was prepared that specifies how interested parties will be kept informed about activities at the site and how community input will be solicited and considered for decision-making. Community involvement activities, which are organized largely around milestones in the remediation process (e.g., RI/FS), involve a variety of activities, including:

- Informal meetings for the distribution of informational material (e.g., results of studies)
- Organization of public input and review committees (e.g., Technical Oversight Committee and Citizens Advisory Committee for Commencement Bay)
- Preparation of progress reports and fact sheets
- Formal public meetings with presentation of study findings and conclusions (e.g., at the conclusion of the RI) and recommended remedial alternatives (e.g., at the conclusion of the FS)
- Preparation of a responsiveness summary describing and responding to significant community comments to coincide with preparation of the ROD.

Ecology Shipyard Education Program—Ecology is implementing an education program in support of issuing NPDES permits to shipyards. Two workshops were held by Ecology for shipyard owners and operators in 1987 to distribute information on BMP and an NPDES

supplementary permit questionnaire. Shipbuilding and ship repair facilities are being issued NPDES permits as a result of a policy decision to treat certain facilities, such as graving docks and haul-out areas, as point source discharges. Permit questionnaires have been completed to provide Ecology with a variety of information about operations at the shipyards, including services provided, yard capacity, hydroblasting/sandblasting practices, painting practices, engine and equipment repair services, waste disposal services, and management practices.

Ecology is performing site inspections at facilities in the Commencement Bay area. Applications for NPDES permits will be submitted to Ecology by January 1989 by all applicable facilities.

Ecology Marina Education Program--Ecology staff are currently working with TPCHD and the City of Tacoma sewer utility to implement an education program for marinas that operate or lease ship maintenance or repair facilities. The emphasis of the program is similar to the education program for shipyards but does not focus on the issuance of NPDES permits. Ecology staff sponsored a workshop on the problems associated with ship repair and maintenance (e.g., use and disposal of anti-fouling paints and paint residue) in May 1988.

In addition to the marine education program, and in coordination with other agencies (e.g., Washington Department of Social and Health Services, Tacoma sewer utility), Ecology is exploring possible incentive mechanisms for facilitating the installation of holding tank pump-out facilities in marinas (e.g., potential use of wastewater treatment plant grants for the installation of pump-out facilities that discharge to sanitary sewer systems).

TPCHD Public Awareness Program—TPCHD is involved with several public awareness/public education efforts. As part of special programs (e.g., the TPCHD/City of Tacoma storm drain program and small hazardous waste generator programs), TPCHD has developed and distributed general information materials to area businesses, including packets on how to properly handle and dispose of hazardous wastes. On an ongoing basis, TPCHD also provides presentations on waste management and disposal to business and trade associations in the Tacoma area.

Tacoma Public Works Department Public Education Programs—The Tacoma Public Works Department has developed several public education programs aimed at reducing the input of contaminants to Commencement Bay from storm sewers and sanitary sewers. These include:

- Household hazardous waste program--Distribution of public information on the proper use and disposal of household products containing hazardous materials (a hazardous waste hotline is currently under development to further support this effort)
- Educational program for small-quantity hazardous waste generators—Primarily an education program to ensure proper use and disposal of hazardous substances used in small quantities by business and industry (the program also involves a

limited number of inspections primarily aimed at providing small waste generators with technical support)

Presentations on hazardous waste management and disposal to teachers associations and chambers of commerce.

2.8 FUTURE REGULATORY SETTING FOR SOURCE CONTROL AND SEDIMENT REMEDIAL ACTION

Future source control and sediment remedial activities in Commencement Bay problem areas will be heavily influenced by developments in several regulatory programs, particularly various program elements of the PSWQA Plan (PSWQA 1988) and requirements of the Water Quality Act of 1987, which go into effect over the next several years.

Program plans and activities that will affect source control efforts are summarized in Figure 5. Expected to play a major role in source control efforts are program elements of the PSWQA Plan, particularly elements of the Municipal and Industrial Discharges Program (denoted by a "P" in Figure 5) and elements of the Stormwater and Combined Sewer Overflows (CSO) Program (denoted by an "SW" in Figure 5). (Dashed brackets indicate uncertainty in timing because of Ecology hiring delays or funding limitations.)

Element P-2 requires that Ecology adopt standards for classifying sediments having adverse effects on biological resources. It is expected that these criteria, along with existing water quality criteria, will be used to support the development of toxic limits in effluents and effluent particulates (program elements P-6 and P-7, respectively). Program element P-3 requires that Ecology adopt criteria for establishing dilution zones surrounding wastewater discharges, and program element P-8 requires that Ecology include monitoring requirements in wastewater permits. Program element P-5 supports these requirements by requiring Ecology to prepare a procedures manual for permit writers and assist them in researching and writing appropriate conditions for NPDES and state permits. Program element P-20 is expected to support additional source identification in poorly characterized problem areas by requiring that Ecology carry out a coordinated program for detection of wastewater discharges not covered by permits.

Program element SW-1 requires that all counties and cities in the Puget Sound basin 1) adopt ordinances requiring stormwater controls for new development and requiring maintenance of private stormwater systems, and 2) develop operation and maintenance programs for new and existing public stormwater systems. Comprehensive urban stormwater management programs are required under program element SW-2. Tacoma is one of the six cities targeted for the initial round of program development. The Washington Department of Transportation is required to develop a program to control highway runoff under program element SW-5. The Water Quality Act of 1987 required that industrial and municipal storm drains be regulated by NPDES permits. This requirement is described in greater detail in Section 2.5.1.

Program plans and activities that will affect sediment remedial efforts are summarized in Figure 6. A number of program elements of the Puget Sound Water Quality Management Plan will influence future sediment remedial activities, particularly elements of the Municipal and

Industrial Discharges Program (denoted by a "P" in Figure 6) and of the Contaminated Sediments and Dredging Program (denoted by an "S" in Figure 6).

A number of the program elements that influence source control also relate to sediment remedial action, because the sediments are in many cases the ultimate sink for contaminants in storm drains and municipal and industrial discharges. The development of criteria for classifying sediments with adverse biological effects is required in program element P-2. These criteria are meant to establish levels of sediment contamination that would be acceptable throughout the sound and to be a basis for preventing future contamination. The need to develop criteria for sediment dilution zones will be considered under program element P-3.

A number of elements of the Contaminated Sediments and Dredging Program will influence future sediment remedial activities. Confined disposal standards for sediments classified as having adverse effects are established under program element S-4. Once promulgated, these standards will become ARARs for sediment remedial activities. After disposal standards for sediments having adverse effects have been established, the PSWQA will determine the degree to which existing programs (e.g., shoreline master programs, solid waste rules, hydraulics permits, and the PSWQA Plan) should be modified (program element S-5). The utility and viability of establishing a system of multi-user confined disposal sites will be studied as program element S-6. Finally, guidelines for sediment remedial action will be developed as part of program element S-7.

Regulatory Authorities for Source Control Activities

Appendix A of Record of Decision (U.S. EPA 1989)

APPENDIX B Identification of Source Types

groundwater.

 Direct dumping of material into the waterways or storm drains is also included in this category of sources.

2.0 LEAKS

Leaks from tanks, lines, process operations, or containment structures typically result in soil, groundwater, or surface water contamination. Leaks are typically an indirect source of contaminants to the problem areas. Leaks are unpermitted, unintentional discharges that are usually point sources. The following are examples of leaks that have been identified in Commencement Bay:

- Leaking transformers at a site contaminated site soils
- Leaking tanks at a petroleum products recycling facility adjacent to Hylebos Waterway contaminated surface soils.

3.0 WASTE PILES, LANDFILLS, AND IMPOUNDMENTS

Waste piles, landfills, and impoundments are grouped together because they are typically concentrated sources of contaminants that are in relatively close contact with the environment. These sources are usually indirect sources of contaminants that enter problem areas via soil erosion or secondary pathways, such as surface runoff or leaching to groundwater. The following are some examples of this type of source:

- Waste mud from the production of alum has been disposed of in four large ponds at a facility adjacent to Sitcum Waterway. Leachate from the ponds has contaminated soil and groundwater underneath the ponds with several metals, including arsenic, lead, and zinc.
- During construction of a freeway near Thea Foss (City) Waterway, a large volume of coal tar waste was uncovered. The coal tar waste contributed to contamination of site groundwater with polycyclic aromatic hydrocarbons (PAHs).
- Oil from a waste oil reclaiming pond has migrated into soils and ground-water.

4.0 STORM DRAINS, DITCHES, AND CREEKS

Storm water runoff is typically considered a nonpoint source of pollution, even though it is usually collected and routed to nearby surface waters via storm drains, ditches, or pipes (i.e., point source discharges). Nonpoint surface water pollution is generated when storm water comes into contact with pollutants that have accumulated on the land surface. Storm water runoff contamination is generally related to land use in the drainage basin.

The Commencement Bay Nearshore/Tideflats area is served by a combination of city and private storm drains. The city storm drains serve the larger tideflats and metropolitan

IDENTIFICATION OF SOURCE TYPES

This appendix describes the types of sources that have been identified in Commencement Bay. For this discussion, the different types of sources are evaluated based on the following attributes:

- Permitted or unpermitted discharge
- Point or nonpoint (area) source
- Variable or steady discharge
- Passive (inadvertent) or active (deliberate) discharge
- Direct or indirect source.

The attributes of each source type determine the source control methods that are most effective for that source and, accordingly, become the basis for developing screening tools to assess the effectiveness of source control.

1.0 SPILLS AND INAPPROPRIATE MANAGEMENT PRACTICES

Spills are unpermitted sources that can be either point or area sources, may enter the waterway through a variety of pathways, are intermittent, and are typically an inadvertent discharge. Because spills are primarily caused by human error or carelessness, they are difficult to control.

Inappropriate management practices can also be a source of contamination. Waste management practices such as sweeping metal debris, ore, or sandblast grit into waterways have resulted in sediment contamination in Commencement Bay. In addition, deliberate dumping of wastes has been documented at a some sites. Inappropriate management practices are similar to spills, except they are sometimes intentional discharges and may occur regularly from predictable sources. The following examples illustrate the variety of spill and management practice-related sources that have been encountered in Commencement Bay:

- Ore unloading operations in Sitcum Waterway have resulted in direct spills of various ores into the waterway and onto the dock area. Ore spilled onto the dock has been swept or hosed into the waterway. In addition, ore spilled on docks or soil has collected in storm drains, resulting in the release of metals in the particulate and dissolved form through storm drain discharges.
- Shipyards have discharged sandblast grit containing metals and paint spray directly into the waterways. Sandblast grit spilled in the yard and drydocks contributes to metals in surface water and storm drain runoff.
- Oil spills have occurred, leading to eventual contamination of soil and

6.0 SURFACE WATER RUNOFF

Surface water runoff from contaminated soil or pavement can be a major contributor to contaminants in storm drain discharges to problem areas. Surface water runoff, like storm drain discharge, is a passive, intermittent source, which can be either a point source (when it flows into a storm drain) or an area source (when it enters the waterway directly). The following are examples of surface water sources to the waterways:

- Smelter slag, used as ballast at log sort yards adjacent to Hylebos Waterway, has contributed metals to surface water runoff that directly enters the waterway
- Sandblast grit and metal shavings in the yard of a metal shop has contributed to elevated metals concentrations in surface water discharging through storm drains to Sitcum Waterway
- Surface water runoff from city streets has contributed oil, PAHs, and lead to storm drains leading to all the waterways.

7.0 GROUNDWATER DISCHARGE

Groundwater discharge to the waterways is a unique type of source. Groundwater enters the waterways as an ongoing area source, and concentrations in groundwater are difficult to sample at the point of entry. The documented sources of groundwater contamination that affect sediments in the problem areas are those directly adjacent to the waterways. Contamination in groundwater at the point of entry may not easily be traced back to an inland source or sources. Contaminants from a facility adjacent to the waterways could potentially enter more than one waterway. Groundwater can also infiltrate storm drains discharging to problem areas. The following are some examples of groundwater contamination that may have contributed to sediment quality degradation in Commencement Bay:

- Improper storage and handling of petroleum products has resulted in floating product on the groundwater at the D Street petroleum facility
- Smelter slag used as ballast at several log sort yards has contaminated groundwater with arsenic and other metals
- A large chemical manufacturing company has contaminated groundwater with arsenic; the groundwater is seeping into Hylebos Waterway.

area, and private storm drains generally serve areas immediately adjacent to the waterways. Storm drain outfalls may be considered simple or complex sources, depending on the size of the drainage basin served by the storm drain and whether sources of contaminants to the storm drain system can be easily traced. Most storm drains are intermittent sources of contaminants to problem areas; a few, such as those at the head of Thea Foss (City) Waterway, flow continuously. Some storm drains receive surface water runoff from a single facility. Others, such as municipal storm drains, may carry runoff from city streets, residential areas, and a large number of commercial and industrial facilities. The following are examples of storm drains that have been identified as sources to problem areas in Commencement Bay:

- Municipal storm drains have been found to be important contributors of contaminants such as lead and PAHs to problem areas, particularly in Sitcum, Thea Foss (City), and Wheeler-Osgood waterways
- Waste oils from maintenance shops have entered storm drains that discharge to waterways
- Liquids and sludges from a paint spray booth were discharged into a storm sewer, contributing to sediment contamination in a waterway.

Storm drain discharge can be estimated from the size and land use of the contributing area and the mean annual precipitation for the Tacoma area. Contaminated sediments from storm drains, ditches, and creeks are also potential sources of contamination to sediments in the waterways.

There are other source types, such as drainage ditches and creeks, that have many of the same source characteristics as storm drains. Ditches and creeks are also conduits that collect storm water runoff from facilities and city streets and discharge as point sources to some of the waterways. Hylebos Creek, discharging into Hylebos Waterway, is a good example of such a source.

5.0 EFFLUENT OUTFALLS

Effluent outfalls are similar to storm drains at the point of discharge to the waterway, but they have several significant differences. Effluent outfalls generally have a known source, are active discharges, and are often more ongoing than intermittent. Discharges from such outfalls can be important sources of contaminants to the waterways, as illustrated by the following examples:

- Effluent discharge from a large kraft mill contributed to contamination of the St. Paul Waterway with organic chemicals
- Discharge of effluent containing chlorinated organic compounds from chemical manufacturing plants contributed to sediment contamination in Hylebos Waterway
- A wastewater discharge containing problem chemicals entered Kaiser Ditch, which discharges to Hylebos Waterway.

APPENDIX C

Department of Ecology and EPA 1992 Cooperative Agreement

DEPARTMENT OF ECOLOGY AND EPA

1992 COOPERATIVE AGREEMENT

COMMENCEMENT BAY
NEARSHORE/TIDEFLATS
for
Operable Unit #1
SEDIMENT REMEDIATION
(Management Assistance)
and
Operable Unit #5
SOURCE CONTROL
(State Enforcement)

Project Narrative Statement

Activities for Operable Unit #1

Budget Breakdown for Operable Unit #1

Activities for Operable Unit #5

Budget Breakdown for Operable Unit #5

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1. Project Objectives

- The primary objective of this cooperative agreement is to maintain a high degree of coordination between EPA and Ecology during implementation of Remedial Design and Remedial Action (RD/RA) efforts under Operable Unit #1 (Sediment Remediation) and to maintain the schedule for RD/RA under Operable Unit #5 (Source Control) which was originally described in the Integrated Action Plan (12/88) and subsequently updated in the CB/NT Record of Decision (9/89) and annual reports submitted per this agreement. Ecology intends to continue agency involvement in source control and sediment remediation activities by maintaining an Urban Bay Action Team based in Ecology's Southwest Regional Office.
- 2) Develop and implement, in coordination with the CB/NT ROD and Program Element P-20 and P-13 of the Puget Sound Water Quality Authority Plan, a program to identify and investigate additional sources of hazardous substances being discharged to the waterways of Commencement Bay.
- With enforcement authorities granted by Chapters 70.105D RCW (Hazardous Waste Cleanup Act), 173-340 WAC (Model Toxics Control Act Cleanup Regulation), 90.48 RCW (Water Pollution Control Act), 173-303 WAC (State Dangerous Waste Regulations) achieve control of identified sources to the CB/NT problem areas as set forth in the CB/NT ROD. These sources and others to be identified during implementation of this cooperative agreement will be dealt with in a manner that closely parallels the CERCLA process (as described in 'Enforcement' below).
- 4) Assist EPA as necessary in Remedial Design and Remedial Action negotiations and implementation for sediment cleanup in each of the eight problem areas defined in the CB/NT ROD.
- 5) Perform Community Relations activities in accordance with CERCLA-SARA and NCP requirements and guidance.

2. Management Commitments

The Washington State Department of Ecology (Ecology) is the state agency responsible for implementing this combination Management Assistance and State Enforcement Cooperative Agreement to assist EPA in source control and sediment remedial activities for the CB/NT Superfund site. Ecology is responsible for the execution, administration and management of the cooperative agreement and for the performance of the activities as described in the scope of work of this agreement. Ecology will contract, in compliance with applicable Federal and State procurement regulations, the performance of the activities as necessary to accomplish the objectives of the work scope. Ecology will comply with and/or will require contractors and subcontractors to comply with applicable general grant regulations and procurement regulations (40 CFR 31, and 40 CFR 35, subpart 0).

During the course of source control and other activities addressed in this cooperative agreement, Ecology provides the following commitments to comply with statutory requirements, regulations and guidance promulgated by the Superfund Program.

1. Off-site Treatment. Storage or Disposal

If the State and EPA determine that any hazardous substance or pollutant or contaminant will be transferred off-site as part of a removal or remedial action, the state agrees to comply with the requirements of CERCLA Section 121(d)(3) and EPA's requirements for off-site transfer described in OSWER Directive No. 9834.11 (November 13, 1987). In addition, as required under CERCLA Section 104(c)(3), if hazardous waste will be transferred off-site, the state will identify, by amendment to this agreement, those hazardous waste disposal facilities in compliance with subtitle C of the Resource Conservation and Recovery Act that are available to receive hazardous waste. EPA will determine the acceptability of such facilities to receive hazardous waste.

2. State/EPA Inforcement Agreement

The State and EPA have developed an enforcement policy for the Nearshore/Tideflats Cooperative Agreement. The enforcement policy is considered a key element in implementing this cooperative agreement. A purpose of the policy is to establish a mechanism for information exchange and decision-making. For purposes of this Agreement, enforcement is defined as actions holding legal status such as wastewater discharge permits, notice/demand letters, consent decrees, notices of violation, penalties or correspondence relating to existing or potential actions. The consulting and information exchange requirements of the enforcement policy do not include minor technical decisions or issues relating to or resulting from such technical decisions. These decisions are to be made by the lead agency in accordance with the EPA/Ecology Superfund Hemorandum of Agreement.

- Notice of intent to settle or initiate proceedings EPA and Ecology agree that, with respect to the claims which each may be entitled to assert against a responsible party(s) for reimbursement of any services, materials, monies or other thing of value expended by EPA or Ecology or for response activity at the site, neither EPA nor Ecology will enter into a settlement with or initiate a judicial or administrative proceeding against a responsible party for the recovery of such sums except after having given notice in writing to the other party to this cooperative agreement not less than thirty (30) days in advance of the date of the proposed settlement or commencement of the proposed judicial or administrative proceedings. Neither Ecology nor EPA will attempt to negotiate for nor collect reimbursement of any response costs on behalf of the other party.
- b. Cooperation and coordination in cost recovery efforts

 EPA and the State agree that they will cooperate and coordinate in efforts to recover their respective costs of response actions taken at the site described herein, including the negotiation of settlement and the filing and management of any judicial actions against potential third parties. This shall include coordination in the pursuit of evidence and witnesses available to each in the preparation and presentation of any cost recovery action, excepting any documents or information which may be confidential under the provisions of any applicable State or Federal law or regulation.
- c. <u>Litigation under CERCLA Sections 106 and 107</u>
 The award of this cooperative agreement does not constitute a waiver of EPA's right to bring an action against any person or persons for liability under CERCLA Sections 106 and 107, or any other statutory provision or common law.
- d. Judicial Action in U.S. District Court

 EPA and Ecology agree that judicial action taken by either party against a potentially responsible party pursuant to CERCLA for recovery of any sums expended in response actions at the site described herein shall be filed in the United States District Court for the judicial district in which the site described in this Cooperative Agreement is located, or in such other judicial district of the United States district courts as may be authorized by section 113 of CERCLA, and agreed to in writing by the parties of this Cooperative Agreement. This paragraph does not prohibit the State from seeking cost recovery for expenditures of its own funds, relying solely on state legal authority.
- 3. Site Access and Permits

 Ecology agrees to satisfy all Federal, State, and local requirements, including permits and approvals, necessary for

implementing activities addressed in this cooperative agreement. Ecology will provide access to the site, as well as all rights-of-way and easements necessary to complete the response action. Ecology will provide access to EPA employees and representatives at all reasonable times.

4. Health and Safety Plans

Ecology will follow existing health and safety plans that have been developed for the various Commencement Bay sites and activities during the RI and FS plans.

5. <u>Laboratory Quality Assurance</u>

Ecology will follow laboratory Quality Assurance plans that are consistent with EPA guidance and policy.

6. <u>Community Relations Plan</u>

Ecology will follow the existing Commencement Bay Community Relations Plan and participate in the EPA Technical Discussion Group meetings when requested by EPA.

7. Reporting Requirements

Ecology agrees to submit progress reports to the EPA Project Officer at quarterly intervals commencing at the start of the project: These reports will include describing progress with respect to the CB/NT ROD schedules, community relations activities, any necessary assistance to EPA on RD/RA negotiations, and any activities trackable under the Superfund Comprehensive Accomplishments Plan (SCAP) for CB/NT Operable Unit #5.

Ecology will also submit a draft annual report in January and a final annual report to be agreed upon in June of each year. The annual report will summarize UBAT's activities for source control and sediment assistance in the following state fiscal year.

8. <u>Submission of Documents</u> : Ecology agrees to submit all:

- Final NPDES permits, fact sheets, responsiveness summaries, companion orders to permits, and enhanced Class II inspection reports;
- Final administrative orders/decrees and amendments;
- Notifications of penalties, stipulated agreements and orders of dismissal;
- Field compliance letters;
- Relevant reports prepared by Ecology's Environmental Investigation and Laboratory Services (EILS) program;
- Summary information on voluntary cleanups;

Completed criminal investigations;

to the EPA Project Officer for inclusion into EPA's Administrative Record. EPA will be given the opportunity to review and comment on all draft orders, decrees, and wastewater discharge permits.

9. <u>Duties of the Regional and State Project Officers</u>
The Ecology Project Officer will assure that all project schedules and reporting requirements are met.

10. National Contingency Plan

To the greatest extent possible all major source control and community relations activities conducted under this cooperative agreement will be consistent with the revised National Contingency Plan (NCP), 40 CFR 300, dated July 16, 1982 (47 Federal Register 31180).

11. Access to Files and Confidentiality

- a. Ecology will allow public access to its records in accordance with applicable state law. The EPA will allow public access to its records in accordance with the procedures established under the Freedom of Information Act (Public Law 93-502) and regulations promulgated pursuant thereto. Both parties agree to protect each other's claims for confidentiality of documents related to pending or ongoing enforcement actions generated by either the State or EPA.
- At EPA's request and to the extent allowed by state law, ъ. Ecology shall make available to EPA any information in its possession concerning the site, with the exception of deliberative or policy documents which Ecology would not otherwise be required to disclose. At Ecology's request and to the extent allowed by federal law, EPA shall make available to the State any information in its possession concerning the site. If any information is provided to EPA by Ecology under a claim of confidentiality, it will be treated in accordance with 40 CFR 2, if Ecology has given EPA notice of the claim of confidentiality. EPA will not disclose information submitted under a claim of confidentiality unless EPA is required to do so by federal law and has given Ecology advance notice of EPA's intent to release that information. Absent notice of such claim, EPA may make said information available to the public without further notice.

12. <u>Disclaimer of Agency Relationship</u>

Nothing contained in this cooperative agreement will be construed to create, either expressly or by implication, the relationship of agency between EPA and Ecology. Any standards, procedures or protocols prescribed in this Agreement to be followed by Ecology or its contractors during the performance of is obligation under this Agreement are for assurance of the quality of the final product of

the actions contemplated by this Agreement, and do not constitute a right to control the actions of Ecology. EPA (including its employees and contractors) is not authorized to represent or act on behalf of Ecology in any matter relating to the subject matter of this Agreement, and Ecology (including its employees and contractors) is not authorized to represent or act on behalf of EPA in any matter related to the subject matter of this Agreement. Neither EPA nor Ecology shall be liable for the contracts, acts, errors or omissions of the agents, employees or contractors of the other party entered into, committed or performed with respect to or in the performance of this Agreement.

13. Time and Personnel Schedules

The time schedule in this application begins following the execution of the cooperative agreement between Ecology and EPA. All positions funded by this cooperative agreement are to be within the direct supervision and management of the SWRO UBAT unless otherwise approved by EPA. Ecology has initiated certain management activities and work tasks, with state dollars not part of this Cooperative Agreement, necessary to carry out the work schedule in this Cooperative Agreement.

Ecology will provide a project manager from the SWRO UBAT to oversee any consultant management activities and consultant work task needed to successfully implement this project.

The administrative aspects of the agency procurement systems, computerized accounting systems, staff support systems and supervisory levels are not included as direct costs.

14. Requirements of 40 CFR 35

This award is subject to the procurement standards of 40 CFR 35, Subpart O.

15. Urban Bay Action Team Leader and Staffing ...

Ecology will designate a qualified Team Leader to manage the Commencement Bay Urban Bay Action Team and to oversee the implementation of this cooperative agreement. Ecology will make best efforts to maintain a fully staffed Urban Bay Action Team. Fully staffed, as defined for this cooperative agreement, means at least a staff of 4.5 FTE funded by Ecology and 4.5 FTE funded by EPA.

3. Enforcement Policies

The Commencement Bay Urban Bay Action Team will be utilizing all enforcement tools available under Chapters 70.105D RCW, 90.48 RCW, 173-303 WAC and 173-340 WAC as specified in the Ecology Enforcement Policy (enclosed). Enforcement tools are as follows:

- 1. Criminal Prosecution
- 2. Civil Penalty
- 3. Resource Damage Assessment
- 4. Ecology Removal/Cost Recovery
- 5. Ecology Order
- 6. Consent Decree
- 7. Engineering Review
- 8. Notice of Violation
- 9. Inspection
- 10. Special Notice Letter
- 11. Technical Assistance
- 12. Wastewater Discharge Permit

For contamination sources identified in the eight CB/NT problem areas either in the ROD or through other site related activity by both agencies, the Consent Order, the Consent Decree, or wastewater discharge permit process will be followed for non-emergencies. Following the process described in the Model Toxics Control Act Cleanup Regulation (MTCA), potentially liable persons (PLPs) receive special notice letters requesting they enter into negotiations with Ecology for site investigation and cleanup. This state of Washington process is modelled after the CERCLA process, and it includes:

- o Remedial Investigation
- o Risk Assessment as necessary
- o Evaluation of alternative remediation (FS)
- Attainment of ARAR cleanup standards
- o Public Input process

Ecology may conduct emergency remedial/removal actions.

If Agreed Order or Consent Decree negotiations with PLPs breakdown, Ecology will either:

- Perform remedial investigation and/or actions
- o Issue a unilateral order
- o Issue a penalty
- o Seek direct court action

Sites which discharge wastewater may receive a wastewater discharge permit through either the NPDES or state waste discharge permit program. The process includes:

o Permit application

- Development of a fact sheet which explains the permitting rationals
- Development of a permit which includes effluent limits, monitoring requirements and special studies or conditions
- o Public input process

- Contaminant sources deemed 'potential' will be subject to any of the enforcement tools or a combination thereof, as applicable. In general, the inspector/site manager attempts to tailor the level of Ecology response to match the severity of the problem.

Ecology will also review the Determinations of Non-Significance (SEPA environmental checklists) for projects that will be conducted within Superfund problem areas. If UBAT determines that the proposed project may deleteriously impact sediment quality, it will non-concur on the draft Determination of Non-Significance.

4. Specific Coordination of Source Control Enforcement with EPA

Coordination of enforcement efforts are planned for each of the eight CB/NT problem areas outlined in the CB/NT ROD as Operable Unit #5. The problem areas include:

Mouth of Hylebos
Head of Hylebos
Houth of Thea Foss
Head of Thea Foss
Sitcum
Hiddle
Wheeler Osgood
St. Paul

Coordination will be as follows:

- Monthly meetings between EPA CB/NT Coordinator (Lori Cohen) or her designee.
- Source control site-specific coordination to ensure;
 - a. Cleanup standards and technology are consistent with the CB/NT ROD.
 - b. CERCLIS sites are addressed in a manner consistent with the Superfund process.
- Ecology source control enforcement actions, such as consent decrees, shall be written to ensure PLP recognition of EPA's autonomy over sediment related issues.
- 4. Ecology is committed to co-develop the source control strategy with EPA.
- '5: Ecology and EPA are committed to follow the September 89 CB/NT ROD (Attachment B). The ROD is a CB/NT planning document co-developed by Ecology, EPA, and the Puyallup Tribe.
- 6. Ecology is committed to co-develop with EPA and adhere to a schedule of activities described in Appendix C of the CB/NT Record of Decision. Hodifications to the schedule will follow Condition #15 of this agreement.
- 5. Southwest Regional Office Commencement Bay Urban Action Team

The Commencement Bay Urban Bay Action Team currently has 9.0 FTE funded and employed in Commencement Bay Source Control activities. The state of Washington funds 4.5 FTEs with state funds and EPA funds 4.5 FTEs with federal funds. As a result of Ecology's reorganization of September 1988 UBAT is now part of the Toxics Cleanup Program (TCP). UBAT currently employs 1.0 FTE UBAT team leader; 3.5 FTE site manager/inspector; 1.3 FTE

hydrogeologist; 1.1 FTE environmental engineer; 1.5 FTE administrative and clerical support; 0.3 FTE community relations; and 0.3 FTE section manager. In addition UBAT relies on TCP headquarters staff for contracts assistance and the Environmental Investigation and Laboratory Services program for technical assistance.

The Urban Bay Action Team will utilize the enforcement policies outlined on page 6 of this application for all Superfund related source control work. Superfund related source control activities performed by UBAT will be charged to a specific area described in Operable Unit #5, Source Control (State Enforcement). No non-Superfund related activities will be charged to either Operable Unit 1 or 5.

The Urban Bay Action Team will coordinate all Superfund related source control activities carried out by other Department of Ecology sections (such as Ecology's Industrial Section, Water Quality Program, Solid and Hazardous Waste Program, and the Sediment Management Unit) to ensure consistency with the overall Commencement Bay Superfund process. This coordination work will be charged to Operable Unit \$1, Sediment Remediation (Management Assistance).

For the purposes of this cooperative agreement the Record of Decision (ROD) for the Commencement Bay Nearshore/Tideflats Superfund site (CB/NT) will serve as the basis for future remedial action under Operable Units #1 and #5.

6. Project Narrative Statement

Site Background

Commencement Bay is an embayment of approximately nine square miles of southern Puget Sound, Washington. The bay opens to Puget Sound in the northwest, with Tacoma situated on the south and southeast shores. The mean tidal range in Commencement Bay is 8.1 feet, with a diurnal range of 11.8 feet and an extreme range of 19 feet (U.S. Army Corps of Engineers, 1983). Residential portions of northeast Tacoma and the Brown's Point Section of Pierce County occupy the north shore of the bay. Ownership of this shoreline is vested in the Port of Tacoma, the city of Tacoma, Pierce County, the State of Washington, the Puyallup Indian Tribe, and numerous private entities. Much of the publicly-owned land is leased to provide industrial and commercial enterprises.

The Nearshore is defined as the area along the Ruston Way shoreline from the mouth of City Waterway to Point Defiance, including all waters with depths less than 60 feet. The Tideflats include Hylebos, Blair, Sitcum, Hilwaukee, St. Paul, Middle, Wheeler-Osgood, and City Waterways, and the Puyallup River upstream to the Interstate-5 highway bridge.

On October 23, 1981, the U.S. Environmental Protection Agency (EPA) published an 'interim priority list' of 115 top priority hazardous waste sites targeted for action under Superfund. Commencement Bay, located in

the southern Puget Sound region, was listed as the highest priority site in the state of Washington and one of the 10 highest national priority sites for federal funding of remedial action under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). The Commencement Bay site was divided into the following areas: The deepwater, the nearshore, the tideflats industrial, and the South Tacoma Channel.

On December 30, 1982, EPA proposed additions to the National Priority List. The list increased to 418 hazardous waste sites ranked by their potential threat to public health and the environment. On this list, the nearshore and tideflats industrial areas were designated as a separate superfund site (i.e. CB/NT), as was the Commencement Bay-South Tacoma Channel site. The deepwater area was eliminated as a priority site because water quality studies indicated less contamination in that area than was initially suspected.

On April 13, 1983, EPA announced that an agreement had been reached with the Washington Department of Ecology to conduct a remedial investigation of hazardous substance contamination at the CB/NT site. Under the cooperative agreement, Ecology was delegated the lead role in the investigation. The project consisted of two distinct parts: chemical (metals) contamination of the upland environment near the American Smelting and Refining Company (ASARCO) smelter (Ruston/Vashon task), and the chemical contamination and its effects in the marine environment (waterways/shoreline tasks).

On September 6, 1983, EPA published and promulgated the first official National Priority List of 406 hazardous waste sites, including the Commencement Bay Nearshore/Tideflats site.

The RI was initiated in 1984 and the results were published in 1985. The RI concluded that sediments within the study area contained elevated concentrations of metals and organic compounds.

Beginning in 1986, additional field sampling was conducted for the initial phase of the FS. The purpose of the FS was to develop and evaluate the most appropriate remedial strategies for correcting hazards associated with contaminated sediments in the Commencement Bay Nearshore/Tideflats (CB/NT) site. The FS was published in December 1988 and identified nine problem areas that were recommended for further action under the federal Superfund program. The FS concluded that correction of contamination problems should take place over a period of several years by several regulatory authorities using a wide variety of existing regulations and implemented according to a performance-based Record of Decision.

The feasibility study identifies corrective measures (source controls and sediment remedial actions) for each of the high priority areas. As part of the feasibility study, Ecology prepared an Integrated Action Plan which described many of the specific actions that were required in each problem area. The study was reviewed for public comment from February 24, 1989 to June 24, 1989.

Based on the RI/FS and public comment, EPA developed a ROD for the site on which Ecology and Puyallup Tribe concurred. The CB/NT ROD for the site was issued in September of 1989.

In 1985, Ecology and EPA formed the Commencement Bay Urban Bay Action Team (UBAT). This team was formed to investigate and control ongoing sources of contamination through the use of orders, consent decrees, and wastewater discharge permits. From 1985-1988, four SWRO Ecology staff have been assigned to the team.

Present Status

The Ecology UBAT is currently overseeing a number of investigations and cleanup actions under existing consent decrees, orders and waste water discharge permits. Much of this ongoing work has been incorporated into the fessibility study, the Integrated Action Plan and the ROD. The management assistance and state enforcement requests attached herein will allow UBAT to continue and enhance source investigation and source control activities.

The Commencement Bay Urban Bay Action Team currently has 9.0 FTE funded and employed in Commencement Bay Source Control activities. The state of Washington funds 4.5 FTEs with state funds and EPA funds 4.5 FTEs with federal funds. As a result of Ecology's reorganization of September 1988 UBAT is now part of the Toxics Cleanup Program (TCP). UBAT currently employs 1.0 UBAT team leader; 3.5 FTE site manager/inspector; 1.3 FTE hydrogeologist; 1.1 FTE environmental engineer; 1.5 FTE administrative and clerical support; 0.3 FTE community relations; and 0.3 FTE section manager. In addition UBAT relies on TCP headquarters staff for contracts assistance and the Environmental Investigation and Laboratory Services program for technical assistance.

<u>Definitions</u>

Integrated Action Plan

The Commencement Bay Nearshore/Tideflats Integrated Action Plan (IAP) was published in 1988 as the result of a joint effort between EPA and Ecology to formulate a multi-year strategy for sediment remediation (EPA lead) and source control (Ecology lead) in the Commencement Bay Nearshore/Tideflats (CB/NT) Superfund site.

CB/NT Record of Decision (Attachment B)

The Record of Decision (ROD) was published on September 30, 1989. It addressed eight of the nine problem areas described in the PS. The ASARCO sediments problem area was deferred to a separate operable unit.

The ROD determined that the most appropriate remedy for achieving the CB/NT cleanup objectives was a combination of Source Control/Natural Recovery and Sediment Confinement. The key elements of the selected remedy include the following major elements:

- o Site use restrictions
- o Source control
- o Natural recovery
- o Sediment remedial action (i.e., confinement and habitat restoration)
- o Monitoring

In general, the selected remedy is implemented in each of the different problem areas independently of one another. The overall remedy includes an 8-year active cleanup phase for source control and sediment remediation and a 10-year natural recovery phase. Implementation of source control, the first step in the selected remedy, includes application of regulatory mechanisms and remedial technologies including a full range of all known available and reasonable methods of treatment (AKART) to achieve compliance with applicable or relevant and appropriate requirements (ARARS) and to maintain the sediment quality objectives defined in the ROD. Ecology is the lead management agency for source control under a cooperative agreement with EPA.

Refined Implementation Plan

This plan is the Southwest Region Urban Bay Action Team (UBAT) annual planning document. It includes specific enforcement milestones for all UBAT lead Commencement Bay source control activities slated for accomplishment in the state fiscal year (July through June).

These source control activities include all work required by the CB/NT ROD. Additionally, the Refined Implementation Plan may include Commencement Bay source control activities not located in any of the nine problem areas. This 'non-problem area' workload has been reduced to a minimum and is not part of the work for which EPA funding is sought.

Major Sources

Those facilities/entities specified in the CB/NT ROD as major sources of problem chemicals to the eight high priority segments are considered Major Sources herein.

Potential Sources

These are sources included in Ecology's source control investigations because they drain to the eight high priority segments but which are not specifically listed as major sources. The potential sources have been identified in CB/NT RI, FS, IAP and through comprehensive investigations by UBAT under this Cooperative Agreement. Lists of potential sources will very likely'change over time for the following reasons:

- 1. Some of them may be found to be major sources.
- Some may be found to be non-sources.
- 3. Ownerships and business in the Commencement Bay industrial area are constantly changing.
- 4. Newly discovered sites.

The Refined Implementation Plan may not list all potential sources since the Refined Implementation Plan only covers projected UBAT accomplishments

for one year. UBAT will very likely require two more years [from 1992] before all potential sources can be scheduled for inspection.

For the purposes of State Enforcement of Source Control under Operable Unit #5, the following definitions shall hold:

- 1. Remedial Design (RD) The RD is any source control effort carried out in response to a state superfund (MTCA) hazardous waste or water quality enforcement action (i.e., consent decree, unilateral order, direct court action, permit, etc.) which addresses the discharge or release of Superfund priority chemicals into a CB/NT problem area.
 - A. <u>RD Start</u> For each problem area the RD start shall be the date of the first state superfund source control enforcement action (consent decree, unilateral order, direct court action, wastewater discharge permit, etc.) which addresses RD in that problem area.
 - B. RD Completion For each problem area the RD completion is the date of EPA concurrence that the last necessary state superfund source control activity has been completed. The 'last' source control state enforcement action shall be determined when implementation of source control is completed on the last significant source identified by Ecology UBAT.
- 2. Remedial Action (RA) for Source Control The RA is the implementation of any source control action carried out in response to a state superfund (MTCA) enforcement action, hazardous waste or water quality enforcement action, or wastewater discharge permit, which limits or controls the discharge or release of superfund priority chemicals into a CB/NT problem area.
 - A. RA Start For each problem area this is the date of essential implementation of any RA work carried out in response to a state enforcement action consistent with the definition of RA above.
 - 8. RA Completion For each problem area this is the date of the Regional Administrator's approval of the Superfund Completion Report. A Superfund Completion Report will be developed by Ecology for each problem area. It will summarize the site condition and all construction activities that have been completed in the problem area inclusive of the first and last as defined above.
- 3. The definitions for RD/RA starts and completions incorporate the RD/RA definitions. In addition, the Superfund Completion and Letter Reports shall describe source control actions which have been developed under programs external to Ecology's UBAT. This may include implementation of best management practices (BMPs), if a BMP plan has been developed in accordance with source control objectives

and if implementation of BMP has been verified in practice by inspection.

Jurisdictional Issues

Even though there is an overlap of jurisdictional authority, we have agreed that Ecology's area of jurisdiction will be the upland areas down to the mean high water mark, and EPA's area of jurisdiction will be from the mean high water mark down to the bottom of the bay.

7. Activities For Operable Unit #1 SEDIMENT REMEDIATION (Management Assistance)

Task 1 - Reporting Requirements

Ecology shall submit to EPA the following reports:

a) Quarterly Accountability Report - Ecology's UBAT will submit to EPA Region 10 a quarterly accountability report detailing progress made during the previous quarter with respect to the Refined Implementation Plan (see Task 3 below), CB/NT ROD and SCAP. It is recognized that this quarterly document will be used by EPA to monitor Ecology's progress with respect to the ROD and within the terms of this Cooperative Agreement. This report will be structured to address the priority areas listed below:

Houth of Hylebos Waterway
Head of Hylebos Waterway
Houth of Foss Waterway
Head of Foss Waterway
Sitcum Waterway
Middle Waterway
Wheeler-Osgood Waterway

- b) Annual Report Ecology's UBAT will submit to EPA Region 10 on a yearly basis a plan on how many inspections, investigations, consent decrees, administrative orders, and site cleanups that UBAT plans to conduct during the upcoming year. UBAT will submit a draft plan in January and a final plan in June of each year.
- c) Source Control Completion Reports Addressed under state enforcement activities for Operable Unit #5. The St. Paul completion report has already been submitted.
- d) Source Control Letter Reports Addressed under the Source Control Strategy co-developed by EPA and Ecology.
- Resource Utilization Report A Resource Utilization Report will be submitted to EPA on August 30, 1992 and February 29, 1993. The purpose of these reports will be to document the number of hours spent by Ecology staff on the Commencement Bay project. This report will list the staff names associated with the time charged and will document Ecology funding of 4.5 FTE to the Commencement Bay project as specified in other portions of this agreement. Ecology will provide EPA with a

list of staff position titles and site names associated with project index codes in conjunction with the time report.

Task 2 - PRP Search

Ecology's UBAT will assist EPA in review for accuracy and completeness of information on owners and operators in each problem area prior to notice by EPA on their status as Potentially Responsible Parties (PRPs) regarding sediment remediation activities.

Task 3 - Coordination with Other Ecology Programs

Ecology's UBAT will ensure coordination with other Ecology programs so that cleanup and other goals will be met. This will include coordination with Ecology's sediment management unit to ensure adequate information exchange between that program and the CB/NT project. UBAT will serve as the agency focal point for all CERCLA related activities at the Commencement Bay Nearshore/Tideflats Superfund site.

Task 4 - Review of Sediment Remediation RD/RAs

For the eight high priority areas listed above, Ecology's UBAT will assist EPA in the following Remedial Design/Remedial Action sediment remediation activities.

- Review remedial design scopes of work;
- o Attend technical meetings with PRPs, PRP contractors, and/or EPA on specific RD/RA activities;
- Review draft and final remedial design reports;
- o Participate in RD/RA negotiations with EPA as requested by EPA;
- o Review community relations fact sheets covering sediment remedial actions;
- o Attend public meetings and briefings for local officials and legislators;
- o Respond to press and community inquiries concerning state activities.

Task 5 - Refinement of Cleanup Goals

Ecology's UBAT will assist EPA in refinement of the administrative definition of cleanup goals for Operable Units #1 and #5 and their relationship to each other as conceptually defined in the CB/NT RI/FS and ROD.

Task 6 - Cost Recovery for Operable Unit 1 (Sediment Remediation)

Ecology's UBAT will assist EPA with cost recovery activities relating to sediment remediation efforts.

Task 7 - Information and Financial Management Support

Ecology's Information and Financial Management Section will provide support for cooperative agreement applications, financial tracking, quarterly progress and M/WBE reports, and data management.

9. Activities For Operable Unit #5 SOURCE CONTROL (State Enforcement)

General: All tasks described under Operable Unit #5 are subdivided under the eight problem areas addressed by that project. The tasks are similar for each problem area, but vary according to level of effort (LOE) and budget requirements. Separate tracking of resource utilization and project accomplishments are required in order to coordinate with the Superfund Comprehensive Accomplishments Plan (SCAP) and to facilitate cost-recovery activities.

The level of effort and budget requirements described below should significantly enhance the SWRO UBAT capability and are designed to meet the goals for completing RD/RA efforts for source control and sediment remediation as described in the CB/NT ROD and adjusted under Special Condition #15. Accomplishments will be reviewed on a quarterly basis by EPA to ensure that this ambitious schedule is met. EPA and Ecology recognize that continued funding of this agreement may be contingent upon adequate progress in meeting these ambitious schedules. Currently, the Source Control Implementation Schedules as described in Ecology's 1992 annual report have been met.

Source Control Priority Areas:

Mouth of Hylebos Head of Hylebos Mouth of Thea Foss Head of Thea Foss Sitcum Middle Wheeler Osgood St. Paul

Task 1 - PRP Searches

Ecology's USAT will conduct file reviews, on-site inspections and information requests of sites within each waterway and provide such information to EPA for use in owner/operator information exchange for Operable Unit #1.

Task 2 - Notification/Negotiation/Administrative Judicial Actions

The UBAT will identify and notify appropriate potentially liable persons (PLP's) that are located within each waterway. UBAT personnel will follow the enforcement policies as outlined on page 6 of this cooperative agreement when administrating enforcement actions. Identification and prioritization of PLPs will be in accordance with the CB/NT ROD.

Task 3 - Remedial Design/Remedial Action (RD/RA) Oversight

Ecology's UBAT will perform document reviews, fieldwork oversight, necessary enforcement activities, community relations activities, and other necessary oversight activities for source control sites located within the drainage of each waterway. All work, professional reviews and oversight, and enforcement activities will be consistent with the CERCLA process.

Task 4 - Problem Area Completion Report

When it is mutually agreed by EPA and Ecology that source control has been completed in the waterway, then UBAT shall submit a Superfund Completion Report for source control to EPA. The Superfund Completion Report for source control shall be according to a format provided by EPA.

Head of Hylebos Waterway

Major Sources

Kaiser Aluminum
Pennwalt Chemical Company
General Metals
3009 Taylor Way Log Sorting Yard
Cascade Timber Yard 2 Log Sorting Yard
Wasser Winters Log Sorting Yard
Louisiana Pacific Log Sorting Yard
B & L Landfill
USG Landfill
Tacoma Boatbuilding Co.
Storm Drains

Potential Sources

Cascade Timber Yard #1 Buffelen Woodworking Company Hydro Systems Engineering Hodutech Harine, Inc. Knapp Boat Building Harbor Service Hylebos Marina Hylebos Boat Haven Jones Chemical Manke Lumber Harine Hetal Mfg. Jones Goodell Corp. Fields Products, Inc. B Line Transport Reichold Chemical Puget Chemical Company Western Turning Superlon Pipe **AOL Express** Accurate Packaging, Inc. Hauserman Educators Div. Pacific Paper Products Standard Mechanical, Inc. UNICO Engineering Marine Metals Marine Supply Streich Brothers, Inc. Republic Supply Company Pederson Oil Glacier Sand and Gravel Bonneville Power Administration City of Tacoma Substation Portac, Inc. Weyerhaeuser Petroleum Reclaiming Service, Inc. U.S. Gypsum Plant Site

Murray Pacific Yard #1

Unknown PCBs source(s)

Head of Foss Waterway

Major Sources

American Plating
Hartinac Shipbuilding
Nalley Valley (CN-237) and South Tacoma (CN-237) Storm Drains
Tacoma Spur site
Storm Drain CI-230
Other Storm Drains

Potential Sources

Puget Sound Heat Treating Marine Iron Works Woodworth & Company West Coast Grocery Pacific Storage Marina Facilities Emerald Products Pickering Industries Union Pacific and Burlington Northern Railroads Picks Cove Boat Sales and Repairs Picks Cove, Marina Industrial Rubber Supply Coast Iron Hfg. MSA Boats Custom Hachine Hfg. Western Fish Old Tacoma Light Colonial Fruit & Produce J.D. English Steel Co. Johnny's Seafood Scofield, Tru-Mix, N. Pacific Plywood (closed) Pacific Coastal Oil City Waterway Marina J.H. Galbraith Co. Harmon Furniture Tacoma Spur Site

Mouth of Hylebos Waterway

Major Sources

Occidental Chemical Corporation

Potential Sources

Ak-Wa Samson Marine Sound Refining, Inc. Naval Reserve Haint. Training Facility Naval and Marine Corps Reserve Center PRI Northwest, Inc. Totem Ocean Trailer Express (Tote) Port of Tacoma Industrial Yard Tacoma Boatbuilding Company Commencement Bay Corrugated Chemical Processors Brazier Lumber City of Tacoma Fire Station P.Q. Corp. . Cenex Feed Plan Nordlund Boat Company, Inc. Rail Steel Locomotives Brazier Lumber City of Tacoma Misc. Commercial Businesses

Mouth of Foss Waterway

Potential Sources

Puget Sound Plywood

D Street Petroleum Facilities

D Street Petroleum Facilities (multiple owners)

Coast Craft
Fick Foundry

Gerrish Bearing

Olympic Chemical

Globe Machine

Totem Marine

Sitcum Waterway

Major Sources

Port of Tacoma Terminal 7 Ore Unloading Facilities Storm Drain SI-172 Other Storm Drains

Potential Sources

World Trade Center Ianco, Inc. Tacoma-Port Angeles Auto Freight, Inc. Cole Screenprint, Inc. Shortt Saw & Knife Kaman Bearing & Supply Hertz Equipment Rental Barnacle Bill's Tavern Barthel Chemical Construction Company Transcon McKenzie Fuel Company Tacoma Fire Dept. #12 Fastco Inc. Drury Company Saturn Company Trade Industries Pargas of Tacoma Sound Battery Puget Sound National Bank Georgia Pacific (Relocated in Federal Way) Undgren Dealers Supply, Inc. Mann-Russel Electronics Concrete Technology General Hardware Pacific Storage, Inc. Liquid Air Products Tacoma Marine Services Rheem Mfg. Company Port of Tacoma (Cascade Timber Log Sorting Yard) Platt Electric Co. Timco, Inc. Landscape Bark Jones-Wash. Stevedoring Erdhal Trucking Northwest Wire and Rope Equipment Bennet Staming and Tool Co. Purex Corp. **NPDES WADOO01589** Ryder/Pie Freight Terminal NuLife Fertilizer Georgia-Pacific Resins

NPDES WADOOO3601
Certain-Teed Products Corp.
HcFarland Cascade
Woodlam, Inc.
NuLife Fertilizer
Allied Chemical Corp.
Kaiser Aluminum Warehouse
Norescope Plastics, Inc.
Shaub-Ellison Company
Brown & Haley
Port of Tacoma
(Leased to Sealand)

Middle Waterway

Major Sources

Marine Industries Northwest Cooks Marine Specialties Storm Drain (MD-200)

Potential Sources

Simpson Tacoma Kraft (Stud Hill) Mores Industrial Supply . Paxport Hills Wellwood Washington Belt & Drive Western Machine Pacific Yacht Basin Fire Station Power Substation Coast Craft Foss and Launch Tug Foss/Dillingham Puget Sound Plywood Sound Bilt D-Street Petroleum Facilities (Hultiple Owners)

Wheeler/Osgood Waterway

Potential Sources

Western Dry Kiln
Western Steel Fabricators
Old St. Regis Door Mill (closed)
Kleen Blast
Northwest Container
Rainier Plywood
Chevron
Hygrade Foods
Tar Pits Site (multiple owners) EPA
Cascade Drywall

APPENDIX D

Characterization of Source Control Methods

CHARACTERIZATION OF SOURCE CONTROL METHODS

This section characterizes the available methods of source control. The methods that are effective in controlling a source depend on the attributes of that source. In turn, the types of source control methods that are used determine the screening tools that are applicable to verify source control. Additional information on general and specific source control methods for various industries can be found in Washington Department of Ecology (Ecology) and U.S. Environmental Protection Agency (EPA) guidance documents for source control and best management practices.

1.0 ELIMINATION OF A SOURCE OR PATHWAY

Complete elimination of a source or pathway to a problem area is the most straightforward method of source control. It is also one of the easiest methods to verify because it is a one-time, permanent action. In this context, elimination of a source may mean physical removal of a source, or chemical or biological treatment. The following are examples of one-time source control actions:

- Repair of leaks from tanks or lines
- Cleanup of contaminated soil, waste piles, or impoundments
- Removal of contaminated sediments from a storm drain or ditch (only effective if upstream sources are controlled)
- Discontinuation of discharges to storm drains by eliminating the discharge or hooking the source up to a treatment system or the sanitary sewer
- Cessation of discharges to the waterways
- Discontinuation or substitution of the use or handling of a substance at a facility.

Source removal is not as feasible when the substance is an integral part of the operation of a facility and cannot be wholly self-contained in the process. Source removal (on a reasonable time scale) is complicated when a source has been dispersed or covers a large area, such as contaminated groundwater or an excessive amount of contaminated soil. In such cases, best management practices (BMPs) or containment may be more effective.

2.0 BEST MANAGEMENT PRACTICES

When a source cannot be eliminated or treated, BMPs may be an appropriate source control measure. BMPs include elements of general housekeeping and maintenance, awareness of problem chemicals and their pathways into the environment, and spill

prevention and response. Implementation of BMPs requires an ongoing effort. The following are some examples of best management practices:

- Sweeping shipyards and drydocks routinely and after sandblasting operations to avoid accumulation of metal-containing grit and paints
- Informing employees of management practices that are not allowed, such as sweeping debris into waterways or dumping chemical solvents into storm drains
- Routinely checking tanks, lines, and containment structures for evidence of leaks or spills
- Having a spill response plan in place so that spills are not allowed to reach the waterway and are cleaned up promptly
- Storing batteries and other sources of problem chemicals out of the rain
- Installing berms or storage areas
- Reducing chemical sources, recycling, and reusing problem chemicals.

Ecology and local agencies have developed guidance documents and brochures describing BMPs for various groups including shipyards, marinas, and boat yards; small auto repair and auto body shops; facilities with leaking underground storage tanks; and small print shops, photo labs, and graphic arts firms. New information on BMPs may be included in Ecology's Source Control Users Manual, which is scheduled to be completed by Ecology's Sediment Management Unit in June 1992.

3.0 CONTAINMENT

A companion source control measure to BMPs is ongoing containment of wastes. Containment is also appropriate in situations where the problem chemical is present at the facility and has the potential for discharge into the environment. Such containment measures include building berms or dikes around tanks that could leak or overflow, paving areas of the site, and collecting surface water runoff. As an example, a groundwater drawdown may be created that will prevent groundwater from migrating offsite, or contaminated soil could be paved over and isolated by slurry walls to prevent runoff and infiltration from storm water of contaminants into the environment.

4.0 TREATMENT OF EFFLUENT PRIOR TO DISCHARGE

Treatment of effluent sources is appropriate when a source cannot be removed or otherwise controlled. These situations occur primarily when a permitted effluent is involved or when contaminated water from the site enters a storm drain and an alternative discharge point (e.g., sanitary sewer) is not possible. Examples of treatment include:

Inclusion of sumps or oil/water separator in the storm water drain system to retain oils or other fuels

- Treatment of problem chemicals in effluent or storm drain runoff to levels based on all known, available, and reasonable methods of treatment (AKART) and to satisfy sediment cleanup objectives
- Collection and treatment of contaminated groundwater prior to discharge to surface waters.

5.0 SOURCE CONTROL FOR MUNICIPAL STORM SEWER SYSTEMS

Municipal storm sewer systems are sources that are complex and difficult to control. Major storm drains have been identified as significant sources of problem chemicals to Sitcum, Thea Foss, and Wheeler-Osgood Waterways, and other storm drains have been identified as sources of problem chemicals to these and other waterways. The sheer number of storm drain outfalls and sources of contaminants to the storm drain systems makes them a difficult type of source to regulate. Storm drain effluent can cause water and sediment quality problems, prompting federal and state governments and municipalities to initiate source control for municipal storm sewer systems, as required under EPA's new National Pollutant Discharge Elimination System (NPDES) storm water program. (As part of source control at individual facilities, NPDES permits will also be required eventually for some facilities that discharge storm water directly to the waterways via storm drains. New information on source control efforts for NPDES-permitted discharges may be presented in Ecology's Source Control User's Manual, scheduled to be completed in June 1992).

Contaminants enter municipal storm drains from a variety of sources, including storm water runoff from residential, commercial, and industrial properties. Intentional, illegal discharges of wastewater from industrial or commercial facilities may also contribute contaminants to the storm drains. Typically, storm drain systems service a defined drainage basin, which collects wastewater from multiply entry points for ultimate discharge via a single storm drain outfall. Different source control methods are applicable, depending on the size of the drainage basin served by the storm drain and the type(s) of contaminant sources to the storm drain system.

EPA has recently promulgated the final rule setting forth permit application requirements for storm drain discharges under the Clean Water Act. Regulation of storm drain discharges under the Clean Water Act will be an important component of source control at the Commencement Bay Nearshore/Tideflats site. The rule includes instructions and requirements for NPDES permit applications for storm water discharges associated with industrial activity; discharges from large municipal separate storm sewer systems; and discharges from medium municipal separate storm sewer systems (includes Tacoma and Pierce County, Washington).

For municipal systems, all storm water runoff is regulated, including runoff from city streets. Recognizing that water quality for municipal separate storm sewer systems is more difficult, permits for such systems will include controls on pollutants to the maximum extent practicable. The emphasis for municipal permits is on management programs for source identification and control, including monitoring programs; development of a management plan for source control in residential and commercial

areas; and development of a program to detect and remove illegal industrial discharges to storm sewers, including screening and field sampling.

A two-step method for storm water source control may be necessary. The primary point sources (e.g., commercial and industrial facilities) of contaminants to the storm drains may be controlled. This method of source reduction is advantageous because the quantity of contaminants introduced into the system is reduced, potentially reducing or eliminating the need for treatment of the storm water before discharge. As such, this method may be a preferable long-term solution to the problem. However, identifying and permitting point sources to the storm drains is a resource- and time-intensive process and may eventually require an inspection and permitting program similar to that currently used for municipal sanitary sewer systems.

The second step for source control is to assess the need for end-of-pipe treatment of storm water prior to discharge to the waterway. End-of-pipe collection and treatment allows for a reduction of contaminants to a problem area earlier than might have been possible through control of primary sources alone. Certain sources of contaminants to storm drains, such as runoff from city streets, may not be amenable to primary control of the source. When this method is used, it will still be necessary to implement interim source control measures prior to wastewater treatment to ensure that the treatment system is able to reduce contaminants to acceptable levels. Implementing such a system would require a method for collecting and treating storm water surges and sufficient treatment plant capacity to handle the volume of storm water that would need to be treated each year.

The appropriate method of source control to use for storm drains depends on a number of factors, including climate, rainfall patterns, land use, the severity of the problem, treatment plant capacity, and personnel and monetary resources. In the Commencement Bay Nearshore/Tideflats area, the initial efforts for source control of storm drains are focused on those storm drains that have been identified as major sources to the waterways, particularly those storm drains that are listed as the only major source of one or more contaminants to a problem area.

In evaluating source control verification methods, storm drains are considered a point source to the waterways rather than an area-wide group of primary sources. Therefore, end-of-pipe verification methods such as sediment or effluent sampling are the preferred methods of source control verification.

APPENDIX E

Example Source Control Completion Report

GUIDANCE FOR SOURCE CONTROL COMPLETION REPORTS

[Guidance developed for St. Paul Waterway and may be modified.]

Source Control Completion Reports for each problem area will be developed and submitted by Ecology UBAT according to the schedules confirmed in the most recent EPA/Ecology Cooperative Agreement. EPA will prepare similar Sediment Completion Reports for sediment remedial actions.

Upon completion of all source control actions and sediment remedial actions, EPA will prepare a final Closeout Report for the CB/NT site.

It is expected that the Ecology Source Control Completion Reports will contain the following information in a highly summarized format. The project management database being developed by EPA should greatly facilitate this process. Specific and more detailed documents shall be referenced. The length of each report will vary depending on the number of PRPs associated with the problem area.

A. Summary of Site Conditions

- 1. Brief recap of RI/FS finding in the waterway
- 2. Listing of PRPs identified for the waterway
- 3. Listing of Letter Reports (dates), Milestone Completion Dates

B. For each PRP:

- 1. Inspection dates/findings
- 2. Key administrative actions (dates, requirements, compliance schedules)
- 3. Long-term monitoring plans
- 4. Discussion of known or potential releases of hazardous substances from the site and how these are controlled or are to be controlled. This section should describe how the EPA/Ecology source control guidelines are being met.
- 5. Bibliography
- C. Summary Protectiveness: Discuss how the cleanup objectives in the ROD are being met for the problem area.



Commencement Bay Nearshore/Tideflats St. Paul Waterway Source Control Completion Report

By

Kevin Godbout

Washington State Department of Ecology Toxics Cleanup Program – SWRO Urban Bay Action Team

September 1990

SEPA

September 28, 1990

Reply To

Attn Of: HW-113

MEMORANDUM

SUBJECT: Source Control Completion Report

St. Paul Waterway Problem Area

Commencement Bay - Nearshore/Tideflats Superfund Site

FROM:

Philip G. Millam, Chief

Superfund Branch

THROUGH:

Charles E. Findley, Director

Harardous Waste Division

TO:

Thomas P. Dunne

Acting Regional Administrator

The purpose of this memo is to confirm completion of the remedial action for source control in the St. Paul Waterway of the Commencement Bay - Nearshore/Tideflats (CB/NT) Superfund site. The remedial action has been documented in the attached report by the Washington Department of Ecology (Ecology) in accordance with Cooperative Agreement V-000405-01. The report has been reviewed by my staff to ensure that the remedial action is consistent with the September 1989 Record of Decision (ROD) for the site.

The St. Paul Waterway is one of eight problem areas covered by the CB/NT ROD, which calls for a combination of source control by Ecology and sediment cleanup by EPA to be implemented in each problem area. Cleanup activities are scheduled to occur sequentially on a problem-area basis over the next 15-20 years.

The completion of source control in the St. Paul Waterway is a significant accomplishment in the overall plan to cleanup the CB/NT site. It is the first completed remedial action within the CB/NT site and also sets the stage for completion of the final sediment remedial action in the St. Paul Waterway under EPA oversight. As such, it is an important precedent for similar actions that are required in the other seven CB/NT problem areas.

Disapproved Approved

Thomas P. Dunne

Acting Regional Administrator

9/28/90

Date

Attachment

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STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

2272 Cleanwater Lane (U-11 - Okmpia Washington 9850474011 - 1209) 753-2353

September 26, 1990

Philip G. Millam, Chief, Superfund Branch U. S. Environmental Protection Agency Region 10 1200 - 6th Avenue Seattle, WA 98101

Dear Mr. Millam:

It is my sincere pleasure to submit the Source Control Completion Report for the St. Paul Waterway of the Commencement Bay Nearshore/Tideflats Superfund NPL site.

The initial source control measures began in August of 1985 when the Department of Ecology (Ecology) took action to reduce source loading of problem chemicals to the St. Paul Waterway at the Tacoma Kraft Hill. Over the past five years approximately thirty additional individual source control actions have been jointly implemented by the responsible parties and regulatory agencies. The enclosed report summarizes the actions taken in the St. Paul Waterway Problem Area.

The remaining activities at the site are primarily operation and maintenance related to ensure that cleanup levels specified in the Record of Decision have been achieved and that the constructed remedies are operational and functional and performing to engineering design specifications. I believe that the source control actions taken will prove to be protective of human health and the environment. However, should protectiveness not be achieved, I wish to assure you that Ecology is committed to take additional source control actions.

Should you have any specific questions regarding the content of the report, please contact Keyin Godbout of the Urban Bay Action Team at (206) 491-4959.

Sincerely,

Carol L. Fleskes, Hanager Toxics Cleanup Program

Enclosure

cc: Hike Stoner, EPA

Bill Sullivan, Puyallup Tribe of Indians

Dave HcEntee, Simpson Tacoma

Mike Wilson, Ecology Kevin Godbout, Ecology

Source Control Completion Report Commencement Bay Nearshore/Tideflats Sources St. Paul Waterway

A. Background

In October 1981, Commencement Bay was listed as the top priority site for action in the State of Washington on an interim priority list developed by the U.S. Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The Commencement Bay site was divided into four areas: Deepwater, Nearshore, Tideflats Industrial, and South Tacoma Channel. On December 30,1982 the Nearshore and Tideflats Industrial Areas were designated as a discrete project. In early 1983, the U.S. EPA and the Washington Department of Ecology (Ecology) announced that Ecology would conduct a Remedial Investigation and Feasibility Study (RI/FS) of the contamination in the Nearshore/Tideflats area of Commencement Bay. The RI was initiated in 1984 and the results were published in 1985. The RI concluded that sediments within the study area contained elevated concentrations of metals and organic compounds.

Beginning in 1986, additional field sampling was conducted for the initial phase of the FS. The purpose of the FS was to develop and evaluate the most appropriate remedial strategies for correcting hazards associated with contaminated sediments in the Commencement Bay Nearshore/Tideflats (CB/NT) site. The FS was published in December 1988 and identified nine problem areas that were recommended for further action under the federal Superfund program. The FS concluded that correction of contamination problems should take place over a period of several years by several regulatory authorities using a wide variety of existing regulations and implemented according to a performance-based Record of Decision.

A proposed plan, based on the RI/FS was published for review and comment from February 24 to June 24, 1989. Based on consideration of public comment, EPA selected the remedy for the CB/NT site with the concurrence of Ecology and the Puyallup Tribe of Indians. The Record of Decision (ROD) was published on September 30, 1989. It addressed eight of the nine problem areas described in the FS, the ASARCO sediments problem area was deferred to a separate operable unit.

The ROD determined that the most appropriate remedy for achieving the CB/NT cleanup objectives was a combination of Source Control/Natural Recovery and Sediment Confinement. The key elements of the selected remedy include the following major elements:

- *Site use restrictions
- -source control
- *Natural recovery
- *Sediment remedial action (i.e., confinement and habitat restoration)
- *Monitoring

In general, the selected remedy is implemented in each of the different problem areas independently of one another. The overall remedy includes an 8-year active cleanup phase for source control and sediment remediation and a 10-year natural recovery phase. Implementation of source control, the first step in the selected remedy, includes application of regulatory mechanisms and remedial technologies including a full range of all known available and reasonable methods of treatment (AKART) to achieve compliance with applicable or relevant and appropriate requirements (ARARs) and to maintain the sediment quality objectives defined in the ROD. Ecology is the lead management agency for source control under a cooperative agreement with EPA.

B. St. Paul Waterway

The St. Paul Waterway is located between the Puyallup River to the north and Middle Waterway to the south. The waterway is approximately 2,000 ft long and ranges in width from 400 ft at the head to 600 ft at the mouth. The St. Paul Waterway was created in stages from 1920 to the early 1930s. According to early charts, the inner portion of the waterway was used for log rafts and booms and was navigable to shallow draft boats. In the early 1960s, the head of the waterway was filled to create the current configuration which is about half its former size.

The selected remedy for this waterway included implementation of source control through application of AKARTs, in-situ capping of sediments not expected to recover within 10 years following implementation of source control measures and long-term monitoring. Source control measures required to correct the identified problems and ensure the long term success of sediment cleanup in the problem area include the following actions:

*Control problem chemicals in process effluent by in-plant processes modifications and implement Best Kanagement Practices (BMPs) to minimize and control spills and reduce use rates and generation of pollutants

*Confirm that all sources of problem chemicals have been identified and controlled

*Monitor sediments regularly to assess the adequacy of source control measures.

Analysis of data collected during the RI and FS in conjunction with historical data has revealed the St. Paul Waterway contains elevated concentrations of organic contaminants. The priority problem area contaminants which must be addressed through source control and sediment remediation include 4-methylphenol, phenol, 2-methoxyphenol and 1-methyl-2-(methylethyl) benzene. For source control and sediment remediation purposes, 4-methylphenol was selected as the indicator of the most severe sediment contamination. This compound is widespread in the problem area and is expected to persist in the sediments.

The primary identified source of problem chemicals to St. Paul Waterway is the Simpson Tacoma Kraft facility. The historical source of contamination from the site appears to have been effluent from the wastewater treatment system. The proximity of the most contaminated sediments to the facility's main outfall indicates that this discharge was the route of contaminant input.

C. Source Control Actions

A variety of source control actions have occurred at the Simpson facility. The source control actions that have been implemented or are planned to be implemented include the following:

- *In-plant process modifications
- *Relocation of the secondary treatment outfall
- *Stormwater control
- *Woody debris control
- *Revision of NPDES permit

The in-plant process modifications and relocation of the outfall, with consequent increase in the effluent dilution ratio, are predicted to virtually eliminate sediment accumulation of any problem chemicals that have not been removed from the effluent stream (bibliography reference numbers 6 and 7). A revised NPDES waste discharge permit will require implementation of monitoring and specific studies to verify elimination of problem chemicals in the discharge (draft permit September 1990).

A more detailed description of each individual component of the implemented source control measures follows:

PROCESS MODIFICATIONS: Simpson's source control program was initiated by the former facility owner Champion International when that corporation was directed by Ecology as a requirement of NPDES WA. 000085-0 Section S6E(1) to investigate the causes of excessive discharges of chemicals in the NPDES-permitted outfall effluent. In August of 1985, Champion International complied with NPDES permit condition S6E(1) and submitted results of the chemical source investigation to Ecology. Chemicals identified as problems included copper, chloroform, and cyanide. A summary of results from the Champion investigation and additional investigations initiated by Simpson to reduce loading of organic chemicals (phenolics, methyl phenols and methylated benzenes) To contained in the St. Paul Waterway Area Remedial Action and Habitat Restoration Project report prepared for Simpson by Parametrix, Inc. in July 1987.

Major actions taken to control in-plant processes included: 1) control over chemicals brought to the plant site, either as directly purchased chemicals or as contaminants contained in purchased chemicals or raw materials, and 2) modification of manufacturing processes to eliminate or reduce to acceptable levels chemicals or their precursors which may pass through the treatment system in quantities capable of environmental harm.

The Champion International report (August 1985) indicated that the origin of chloroform was in the pulp bleaching process and that a significant reduction in the amount of chloroform produced could be achieved by reducing the amount of chlorine used. In December 1985 Champion installed mixing equipment which allowed for the elimination of the first hypochlorite stage from the bleaching sequence. During the subsequent year, the operating procedures were refined resulting in a 68% reduction in the amount of chloroform discharged. A further reduction in the amount of hypochlorite used in the bleaching sequence occurred when the extraction stage was changed from a caustic extraction to a oxygen extraction in 1987.

The historic and dominant source of copper into the facility has been vanillan black liquor (VBL). The August 1985 report concluded that the major source of copper in the mill was the wood used in the pulping process, the hogged fuel burned in the power boilers, and perhaps the VBL used in soda makeup. In

compose, the supplier undertook steps to reduce copper concentration in the VBL. Champion recommended to Ecology in 1985 that additional time be requested to evaluate the impact of the reduced copper concentration in the VBL on the effluent concentration. Starting in 1986, Simpson notified the supplier that VBL would not be accepted if the copper concentration was above 60 mg/L. This standard was subsequently lowered to 10 mg/L in March 1986. Through process changes the supplier was able to meet both standards. The VBL copper content has consequently been reduced from 327 tons per year to 0.2 tons or a 99.9% overall reduction. However, because effluent copper concentrations were not recorded prior to initiation of the study the effect of VBL copper input reductions on effluent concentrations cannot be documented. Simpson has determined that based on data collected since August 1985 (at an average copper concentration of 51 ug/l in the treated effluent and an average flow rate of 30.5 mgd) approximately 13 lb/day of copper or 7 lb/day dissolved copper is discharged. The calculations are found in the July 1987 report prepared for Simpson by Parametrix.

The July 1987 Parametrix report also states that during the investigation of the source of chemicals found in contaminated sediments, it was discovered that a supply of liquid salt cake used as a makeup chemical contained significant levels of phenolics, phenol, methylated phenols and methylated benzenes. During 1986, attempts to reduce the level of problem chemicals in the salt cake to Simpson's specification were not successful. Subsequently, the Simpson facility discontinued the use of salt cake. The elimination of this product has resulted in an estimated annual mass loading reduction to the pulp mill of 37 tons of total phenolics, 40.5 tons of phenol, and 7 tons of both cresol and cymene. However, it is currently not possible to draw conclusions on how successful this process modification has been in reducing chemical concentration or mass loading in the effluent. It is expected that this process modification has resulted in a major source load reduction, and monitoring data collected under the NPDES permit will allow confirmation of the actual reduction.

Recent and ongoing capital improvements and changes in operating practices have already reduced discharges of dioxin and chlorinated organic compounds. A bleach plant modernized in 1989 has reduced such discharges by utilization of chlorine dioxide in place of elemental chlorine in pulp bleaching. A new pulp washer line is now under construction which will further reduce formation of the pollutants by reducing the amount of reactive organic material in the pulp-fed to the bleach plant. The washer line is scheduled to come on line in the first quarter of 1991. The use of VBL is also planned to be phased out. Finally, improved operating practices have greatly reduced the amount of recyclable lime by-products discharged to the treatment plant.

Two permit conditions in the 1990 revised NPDES permit will attempt to assess problem chemical presence in the effluent. Results from the studies will be used to determine how successful the processes modifications have been in controlling sources of problem chemicals. The first study involves an annual analysis of the waste water treatment system influent and effluent to characterize the waste stream, track the fate of contaminants and determine efficiency of the treatment system. The second permit condition requires sampling of particulates in the effluent to determine the presence of various chemicals.

OUTFALL RELOCATION: Simpson was required to install a new outfall for the mill's existing secondary treatment plant as a result of the NPDES permit issued by Ecology in 1985. The permit required the mill to design and construct a new outfall by November 1987. In January 1986, Parametrix was engaged by Simpson to provide environmental evaluation and engineering services for outfall improvements. By July 1986, various technical memoranda were completed and used in the evaluation and selection of the final outfall alternative. Technical memoranda were prepared for: initial dilution modeling; circulation and effluent transport; deposition of effluent particulates; subsurface exploration program; chemical analyses of sediment samples; dangerous/hazardous waste evaluation; and geotechnical preliminary design. The new outfall was completed in September 1988.

Two hydrodynamic models, PLUME and MERGE, were utilized in the project for predicting initial dilution and trapping level. The MERGE model indicates that the outfall diffuser achieves an average dilution ratio of 90:1 by the time the buoyant plume stops rising in the receiving water. Based upon the findings and recommendations of the consulting engineering firm, Simpson decided to construct an extended outfall/diffuser which provides a minimum worst-case scientifically defined initial dilution of 55:1, seawater to plant effluent. Additional interpolation of the MERGE model results indicates a regulatory defined "initial dilution" ratio of roughly 30:1 at the edge of a "zone of initial dilution" (ZID). The actual dilution of effluent that occurs at the edge of the dilution zone will be calculated in the future. The requirement for this calculation is contained in the draft NPDES permit.

A number of circulation studies have been undertaken in the past for the Simpson Hill discharge and other projects in Commencement Bay. These prior studies were used as background information for field studies conducted in February 1986 to assess the fate of effluent from the outfall/diffuser. This field data was used in an advective model to determine the net transport of the plume and assess the probability of contact with environmentally sensitive areas. Results contained in the 1986 Parametrix report determined that the large majority of the plume will be carried seaward for the first four hours after discharge and the selected outfall location has a less than 10 percent probability of shoreline contact.

Parametrix conducted a series of bench scale tests to assess the settleability of effluent particulates with seawater. Results from the tests indicated that there is no measurable increase in the areal accretion rate over ambient levels if the dilution is greater than 20:1. Because of the high (55:1) initial dilution predicted with the new outfall, deposition within the first two or three days after discharge is unlikely because the opportunity for solids to contact each other is reduced, thereby inhibiting and delaying flocculent settling. The Parametrix study concluded that deposition of effluent particulates in the shallow subtidal regions near the mill will be virtually eliminated and suspended and dissolved solids in the effluent will be effectively assimilated into the entire Commencement Bay. Confirmation of the models will be conducted when the 1990 NPDES permit is issued. The permit requires Simpson to sample particulates in the effluent, sample and analyze sediments in the vicinity of the outfall for chemicals, and conduct acute bioassay and relative abundance of organisms studies.

Chemical analyses of sediment samples collected along the proposed outfall alignment was completed in February and Harch 1986. Results of the analysis showed that the proposed outfall alignment sediments did not meet the associated criteria designated for dangerous waste and therefore would not be regulated as such. The dredged outfall alignment sediments were placed near the historic outfall location and subsequently capped.

The purpose of the subsurface exploration was to provide subsurface information including soil profiles and geotechnical properties on which the preliminary design of the outfall could be based. Work included field explorations, laboratory testing, soil profile, and discussion of subsurface conditions.

The geotechnical preliminary design was completed in 1986 using the subsurface information and laboratory test results obtained by Parametrix during February and March 1986. This report provided recommendations for the final design of the outfall. The report recommended the most appropriate design is a lightweight pipe that will float in liquefied soil.

NPDES PERMIT: On June 3, 1990, Ecology reissued a draft permit and fact sheet for the Simpson Mill. The issuance of the final permit and fact sheet is anticipated in October 1990. The final permit functions as an Individual Control Strategy for the facility providing for reduction of dioxin and chlorinated organic compounds in effluent and the attainment of effluent discharge

limitations for such compounds.

The permit also sets discharge limits for Biological Oxygen Demand, Total Suspended Solids, and Ph. The basis for establishing numerical effluent limitations for each mill process is found in 40 CFR 430.10 Subpart A (Unbleached Kraft Subcategory), 40 CFR 430.170 Subpart G (Market Bleached Kraft Fulp Subcategory), and 40 CFR 430.80 Subpart H (BCT Bleached Kraft Subcategory) of the Code of Federal Regulations. Effluent limitations for chlorinated organics are based on Best Professional Judgement (BPJ) and dioxin limitations are based on the EPA human health based water quality criteria.

In addition to the effluent limits and the individual control strategy, the Simpson Hill will be required to conduct additional monitoring and testing to determine if source control actions are adequate to prevent sediment recontamination. The monitoring and testing includes: 1; sediment sampling in the vicinity of the outfall to determine if chemicals in the sediment have an adverse effect on organisms living near the outfall; 2; sampling of particulates in the effluent to determine presence of various chemicals; 3; acute and chronic toxicity testing of the effluent; 4; calculation of the actual dilution of effluent that occurs in the receiving water at the edge of the dilution zone adjacent to the mills outfall; 5; analysis of the wastewater treatment system influent and effluent for various pollutants to characterize the waste stream, track the fate of contaminants and determine the efficiency of the treatment system; and 6; a stormwater runoff study and sampling program will occur.

STORMWATER CONTROL: Beginning in 1987, a project was initiated by Simpson to collect and carry stormwater to the facility's treatment system. While most rainfall on the plant site was already collected and treated prior to discharge, there were three areas where containment and control was needed. These areas were the primary clarifier-sludge dewatering building area, paper mill parking area and the Puyallup River bank. The actions initiated in these three areas involved berming, paving and installing sump pumps and piping.

WOODY DEBRIS CONTROL: Several sources including log storage and handling, hydraulic debarking, chip barge unloading, chip conveying and chip storage have contributed woody debris to the sediments. Log storage, log handling and hydraulic debarking have been discontinued, which has eliminated sources for limbs, logs and bark. During the summer of 1987 a new chip barge unloading facility was constructed. The new unloading facility consist of a permanently moored barge with a built-in conveyor leading to the chip storage area. The chip storage area is now isolated from the bay due to construction of a paved, bermed and fenced roadway between the chip storage piles and the bay. Additional measures include paving, berming and fencing along the conveyor system and the installation of additional water sprays and conveyor belt brushes to control airborne emissions.

CONTANINATED SEDINENT REMEDIATION: Under a consent decree signed in December of 1987 between Ecology, Department of Natural Resources, Simpson Tacoma Kraft Company and Champion International, the responsible parties agreed to remediate a 17 acre site of subtidal lands in and around the existing mill site. Through negotiations the parties determined that capping of the contaminated sediments in place was the preferred alternative for remediation. The capping project began in December 1987 and was completed in September 1988. The December 1987 Consent Decree contained a monitoring and contingency plan for the remedial action and habitat restoration project. The plan provided cleanup or performance standards for determining if problems from the remediation occurred.

D. Protectiveness

The selected remedy for St. Paul Waterway includes implementing a full range of remedial technologies and regulatory mechanisms to achieve ARARs including state water quality standards for source control and maintain the sediment quality objectives defined the C8/NT ROD through application of all known available and reasonable methods of treatment (AKART). The second step, correction of sediment problems, included in-situ capping of contaminated sediments above the sediment cleanup objective of 670 ug/kg for the indicator chemical

4-methylphenol.

The relationship between source loading and sediment concentration for problem chemicals was evaluated in 1988 during development of the CB/NT Feasibility Study by using a mathematical model (details of the model are contained in Appendix A of the CB/NT Feasibility Study). The physical and chemical processes of sedimentation, mixing, and decay were quantified and the model applied for the indicator chemical 4-methylphenol. The model predicted that if sources were completely eliminated a natural recovery time of 70 years was predicted for sediments contaminated with 4-methylphenol. The model also predicted that virtually all of the 4-methylphenol input must be eliminated to maintain acceptable contaminant concentration in freshly deposited sediments.

The FS concluded that the actual percent reduction in source loading was subject to considerable uncertainty inherent in the assumptions of the predictive model.

Numerous source control measures have been implemented and are expected to be effective in eliminating sources of the indicator problem chemical 4-methylphenol. No single independent source control action can be considered protective. Protectiveness is ultimately achieved by the interaction of each independent source control action taken. An initial determination of the adequacy of protectiveness is possible when source control actions are designed and implemented based upon predictive models, tests or scientific assumptions.

For example, 4-methylphenol is controlled by an industrial process modification (elimination of salt cake) and based upon initial dilution modeling (PLUME/MERGE) for the new outfall location, an initial dilution of S5:1 seawater to plant effluent is predicted. When the high initial dilution and 10W settleability of effluent particulates with seawater, confirmed by bench scale test, is combined with circulation and effluent transport studies (drogue studies and intermediate field transport modeling) deposition of effluent particulates in the shallow subtidal regions near the mill is predicted by Simpson to be virtually eliminated and suspended and dissolved solids in the effluent effectively assimilated into Commencement Bay. When these actions are combined with other source control measures (e.g., stormwater collection and treatment; elimination of log storage; log handling and debarking; isolation, paving, berming and fencing to control chip emissions), additional protectiveness is achieved. Based upon this combination of multiple source control measures and predictions regarding their cumulative effect, an initial determination that the actions taken are protective is possible, especially in terms of the sediment quality objectives in the CB/MT ROD.

Table 1 of this report contains a complete list of the control measures implemented and predictive tools utilized.

The second test to determine protectiveness includes confirmation that all sources have been identified, controlled and that long-term monitoring is in place to assess the adequacy of the source control measures.

In order to confirm the assumptions and performance of the predictive models and tests used by Simpson, Ecology will insert conditions in the final October 1990 NPDES permit which require: 1) calculation of the actual dilution of effluent; 2) sampling of particulates in the effluent to determine the presence of problem chemicals; 3) influent and effluent sampling of internal waste streams; 4) sediment sampling in the vicinity of the outfall; and 5) acute and chronic toxicity testing of the effluent. In addition to the studies, the NPDES permit contains a reopener such that permit modifications could occur if studies show that the source control measures are not protective of sediment quality.

Other long term Ecology actions taken to confirm protectiveness and assess adequacy include: 1) permittee submittal of monthly discharge monitoring reports which include the results of continuous monitoring of Ph, Flow and Temperature; daily test data for Dioxin, AOX, Biological Oxygen Demand and Total Suspended Solids and weekly test results for Soluble Copper, and 2) regular NPDES permit inspections to verify permittee compliance with self-monitoring requirements and compliance schedules. The different types of NPDES inspections that Ecology conducts include: compliance evaluation; compliance sampling; toxics sampling; compliance biomonitoring and reconnaissance inspection. The methods and procedures for conducting each inspection type is contained in the EPA NPDES Compliance Inspection Hanual.

Most of these NPDES inspections are conducted on a annual basis. During Hay 1988, 1989 and 1990, Ecology conducted compliance evaluation, compliance sampling and reconnaissance inspections of the Simpson Tacoma Kraft Mill. During the compliance sampling inspection wastewater samples were collected from the NPDES permitted outfall and analyzed for all permitted parameters and metals, chlorinated organics and volatile organic compounds. In addition to sampling, the compliance evaluation and reconnaissance inspections included a review of recordkeeping and reporting procedures, a physical walk-through of the facility and review of operation and maintenance practices. Results from each inspection show that the mill was in compliance with permit limits and conditions.

In addition to the source control monitoring requirements, Ecology will require Simpson to continue implementing the 1987 monitoring and contingency plan contained in the State Consent Decree for the remedial Action and habitat restoration project until the proposed EPA Consent Decree is signed by all parties. Results from monitoring conducted in 1988 is contained in a Appendix A of this report.

Analysis of the information reviewed to determine the appropriate level of source control reveals that some uncertainty does exist when predicting protectiveness. The remaining activities at the site are primarily operation and maintenance related to ensure that cleanup levels specified in the ROD have been achieved and that the constructed remedies are operational and functional and performing to engineering design specifications. Based upon a review of the available information it appears that the measures taken will be protective of human health and the environment. The following are some general conclusions regarding the extent of uncertainty present:

- (1) It is not possible to draw specific conclusions on how successful the processes modifications are in reducing chemical concentrations or mass loading to the effluent because little or no data is available which characterized effluent quality prior to the processes modifications. However, operation and maintenance activities and treatment processes operation at the specified engineering design specifications are predicted to reduce the uncertainty.
- (2) The actual dilution achieved and related supporting assumptions such as settleability of effluent particulates and other assumptions used to predict dilution has not yet been actually demonstrated.

- (3) The NPDES permit which requires confirmation of the assumptions and performance of the predictive models and tests has not yet been issued by Ecology and is therefore subject to administrative appeal by Simpson.
- (4) The existence of unknown or not well understood sources such as contaminated groundwater or the Puyallup River may provide a potential source of recontamination. However, both of these sources have been assessed either during the RI process (Puyallup River) or independently by Simpson (contaminant transport modeling by Parametrix in August 1987). In addition to the studies, monitoring of groundwater seeps adjacent to the remediated sediment cap is planned.

A summary of the St. Paul Waterway source control actions, associated protectiveness link and confirmation measure is presented below.

Table 1

Source Control Action	Protectiveness Link	Confirmation Measure
Outfall Relocation		
(Required by NPDES	circulation and effluent transport	modeling/study
Permit WA 000085-0)	effluent particulate deposition	bench test
·	subsurface exploration	testing
	chemical analyses of sediment sample	s testing
	sediment sample designation	testing
	geotechnical preliminary design	design
	initial dilution modeling	modeling
Processes Modifications		
(Required by NPDES	chloroform reduction	testing
Permit WA 000085-0)	copper reduction	testing
	organic chemical reduction	testing
	dioxin reduction	testing
NPDES Permit Renewal		
	effluent limits	monitoring
	sediment sampling	testing
	effluent particulate study	testing
	acute and chronic toxicity testing	monitoring
	dilution zone study	study
	waste stream influent and effluent	
	characterization	study
	treatment system operation plan	plans
		~ plan
	stormwater runoff study and sampling	study
	re-opener condition	condition
Stormwater Control		
	primary clarifier-sludge dewatering	monitor
	paper mill parking area	monitor
	Puyallup River bank	monitor
Woody Debris Control		
	log storage and handling	discontinued
	hydraulic debarking	discontinued
	chip barge unloading	monitor
•	chip conveying	monitor
	chip storage	monitor

Appendix A Remedial Action Honitoring Results

Konitoring of the remedial action occurred in two phases: construction monitoring and long-term post-construction monitoring. Each phase focused on several categories of data acquisition and analysis including physical characteristics, sediment chemistry, water quality and biology. The monitoring components include cap area bathymetry, borrow area bathymetry, debris survey, outfall material disposal migration, capping, water quality, chemical concentrations, benthos, epibenthos, sediment deposition, and cap elevation.

Monitoring activities were conducted in October-November 1988 and again in June-August 1989. These monitoring activities included: 1) physical monitoring of cap thickness, 2) chemical monitoring of potential chemical contamination of cap material, and 3) biological monitoring of the communities populating the newly formed habitat. A summary of the results from monitoring is contained in the protectiveness section of this report.

Physical monitoring of the cap elevation was conducted to determine the cap's stability and sedimentation rate over a 10-month period. Results indicate that no elevation change appeared to threaten either the new habitat or the cap integrity. Changes in the elevation of the intertidal portion of the cap showed changes that were anticipated due to settling and wave action. Transect 1, closest to the Puyallup River mouth, showed a slight increase in elevation. Transect 2 had reduced elevations while Transacts 4 and 5 both showed considerable increases in elevation. Since all major elevation changes were increases in cap thickness, there is no indication of a risk to the cap integrity.

Borrow area bathymetry results indicate that the borrow area has undergone considerable sedimentation in the past year. This sedimentation has resulted in the river essentially returning to pre-dredge conditions. An attempt to directly measure the amount of natural sedimentation occurring on the newly-constructed habitat and cap was made. This study was unsuccessful because most of the plates and markers emplaced to measure sedimentation were lost due to natural causes.

Chemical monitoring was conducted to document the cap's effectiveness in containing contaminants in the underlying sediment. The chemical monitoring plan was to collect cores for the cap material at five locations and to analyze selected 1-ft intervals from near the surface and bottom of the cores to detect and measure selected parameters. Sediment cores were collected on two occasions. The first occasion (November 1988) was used to evaluate the initial cap chemistry, while the second occasion (September 1989) was used to evaluate cap chemistry one year after construction.

Based on two sampling events it appears that most samples from the cap material have chemical concentrations equal to those measured prior to its use as cap material. Only at station C2 have any chemicals been measured above background levels. At Station C2, three chemicals were detected slightly above background concentration in the 1988 samples. During 1989 three cores were taken at Station C2. In 1988 the slightly higher concentrations were found in both the near-surface and bottom samples but not the near-bottom sample for naphthalene, phenol and 4-methylphenol. In 1989 these chemicals were not found at any of the surface samples. These chemicals were measured only at low concentrations in one of the three near-bottom samples and one bottom sample from a different core. All other samples from Station C2 had non-detectable concentrations in the 1989 samples.

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Benthos monitoring indicates that the area has become well-colonized in the year between construction and 1989 sampling period. All cap stations supported a diverse array of animals and within most areas the animals were relatively abundant. Host of the taxa collected in the samples were relatively uncommon, being represented by only one or a few individuals. In general, the same few species were common at all stations; however, their relative abundances varied substantially. Generally, organisms appear to be perceiving the cap as new substrate and are colonizing it relatively rapidly.

The epibenthos data show that many epibenthic prey species, important as juvenile salmonid prey, are colonizing the new cap. However, the cap stations have slightly lower species abundance than the reference stations because they are still undergoing colonization; but, the species diversity on the cap stations is relatively high, meaning a great variety of species are able to thrive at the cap stations.

Macrophyte diversity and abundance on the cap area is relatively low compared to many Puget Sound habitats. Although the algal community on the cap area has probably not reached a stable state, it has colonized most of the hard substrate. It appears that the cap has produced conditions suitable for algae where hard surface is available, within the limitations imposed by the turbid freshwater flow from the Puyallup River.

Quality assurance/quality control (QA/QC) procedures for the analysis of chemical and physical samples followed the Puget Sound Estuary Program guidelines (Tetra Tech 1986). All EPA Contract Laboratory Procedures were used for the organic analyses of these samples. The specific QA/QC plan is contained in Appendix D of the Consent Order for cap monitoring.

Authority	Activities	
Air Emissions		
Puget Sound Air Pollution Control Agency and Ecology	Prevention of Significant Deterioration permits are issued by either the Puget Sound Air Pollution Control Agency or Ecology, depending on source type. Ecology's air section issues permits for the aluminum, pulp and paper, and refinery industries. (Notice of Construction permits are issued by the Puget Sound Air Pollution Control Agency for facilities under construction.)	
Storm Drains		
NPDES	The NPDES program has established a schedule for permitting storm drain systems based on the size of the service area. Permits will require development of plans for contaminant control.	
TPCHD and city of Tacoma Marine Resource Protection Program and Storm Drain Program	These programs include source mapping, storm drain sampling, source control, interagency coordination, nonpoint source investigations, and permit reviews.	
City of Tacoma storm drain construction and maintenance	Sewer inspections are conducted to assess physical integrity and proper function, and verify sewer hookups and sanitary sewer/stormwater separation.	

Source: Record of Decision (U.S. EPA 1989).

TABLE 1. REGULATORY AUTHORITIES FOR SOURCE CONTROL ACTIVITIES

Authority	Activities	
ontaminated Facilities		
Federal and state hazardous substance cleanup programs under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Model Toxics Control Act	Under federal and state authorities, investigations, assessments and remediation (including remedial investigation/feasibility study) are required by EPA and Ecology.	
State Dangerous Waste Regulations	Procedures and criteria for identifying dangerous waste and extremely hazardous waste are enforced by Ecology.	
Federal Resource Conservation and Recovery Act (RCRA)	Under federal authority, EPA and Ecology impose a permit system for facilities that treat, store, or dispose of hazardous materials.	
Tacoma-Pierce County Health Department (TPCHD) Solid Waste Permit	Under authority of state solid waste laws and regulations TPCHD issues permits for disposal sites for nonhazardous solid waste in the Tacoma area.	
stewater Discharges		
National Pollutant Discharge Elimination System (NPDES)	Under the federal Clean Water Act, NPDES permits are required for all facilities with direct discharges to surface waters (NPDE) permits will subsequently be required for some stormwater discharges).	
Washington State Waste Discharge Permits	Washington state requires that all known available and reason able methods of treatment be utilized for discharges of wastewater to surface water, municipal treatment plants, and groundwater (does not duplicate NPDES).	
Industrial Pretreatment Program	Under the federal Clean Water Act, EPA set effluent standard for certain industry categories for discharges to municipal treat ment plants. The city of Tacoma operates an industrial pretreat ment program and issues permits to industries discharging to the treatment plant (program does not duplicate state waste discharge permits).	